THE
SEAMAN's COMPLETE
DAILY ASSISTANT,

BEING

An eaſy and correct METHOD of keeping a
JOURNAL at SEA.

CONTAINING

Rules for working the Caſes in Plain, Middle Latitude, and Mercator's Sailing, by the Tables of Difference of Latitude and Departure.—And for finding the Latitude, Longitude, Amplitude, and Azimuth, by Obſervation. Illuſtrated by a ſufficient Number of Examples.

LIKEWISE,

Rules ſhewing how the Allowances are to be made for Lee-way, Variation, Heave of the Sea, Setting of the Currents, &c.—And to correct the Dead Reckoning by an Obſervation, in all Caſes.

The New Method of finding the Latitude by two Altitudes of the Sun.

To which are added,

The Tables of Difference of Latitude and Departure to 300 Miles Diſtance; the New Solar Tables and Tables of Natural Sines; with a larger and more correct Table of the Latitudes and Longitudes of Places, than any hitherto publiſhed; together with all the Tables neceſſary for the Seaman's Uſe in working a Day's Work at Sea.

The Whole conſtructed upon a NEW PLAN.

The THIRD EDITION.

By JOHN HAMILTON MOORE,
Author of the PRACTICAL NAVIGATOR,
And formerly of the Royal Navy.

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A correct Table of Meridional Parts
A Table for finding the Latitude by two Altitudes of the Sun
A Table of Natural Sines
A Table of Semi-diurnal and Semi-nocturnal Arches, ſhewing the Time of the Sun, Moon, or Star's Setting when they have North Declination, and the Time of their Riſing when they have South Declination, illuſtrated by Rules and Examples of the Sun, Moon, the fixed Stars and Planets

To this Book are added ſome uſeful Hints to Seamen, viz.

The beſt Method to prevent Veſſels' Anchors from coming Home
Of Fothering a Veſſel to ſtop Leaks
Of Veſſels driving on Shore
Of Link-worming of Cables to prevent them from being wounded or parting in rocky or ſtoney Ground, and to defend them from Ice. Theſe, and many other Remarks, are inſerted in this Book, not to be found in any other of the Kind.

ERRATA.

Java Head in Lat. 6° 45′N. and Long. 104° 50′E.

Juſt publiſhed, Price 2s.
The COASTER's COMPANION, ſhewing the Bearing and Diſtance of all the Ports, Capes, &c. of Britain, Ireland, France, Holland, the Baltic, &c. with a Large Tide Table.

NAVIGATION EPITOMISED,

And rendered eaſy to any common Capacity.

THE great End and Buſineſs of Navigation is to inſtruct the Mariner how to conduct a Ship through the wide and pathleſs Ocean, to the remoteſt Parts of the World, the ſafeſt and ſhorteſt Way, in Paſſages navigable: In order to which, he muſt be able at all Times, to find the Courſe and Diſtance from one Place to another; and to determine the Place of the Ship every Day; what Courſe he muſt ſteer, and how far, to gain his intended Port.

The Ship's Place at Sea, and indeed all other Places, are determined by their Latitudes and Longitudes.

The Latitude of any Place is its Diſtance from the Equator, counted upon an Arch of the Meridian North and South, and can never exceed 90 Degrees.

The Equator is that Line which divides the Earth into two equal Parts, the one North, and the other South; being 90 Degrees from each Pole.

The Meridian of any Place is a Line paſſing through that Place, the Equator and Poles, and divides the Earth into two equal Parts, the one Eaſt and the other Weſt; or it is that Line which the Sun comes upon when it is Twelve o'Clock. All Places that lie Eaſt or Weſt have their different Meridians; one of which is called the firſt Meridian, but variouſly placed: The Engliſh place theirs at London, the French at Paris, &c. and count the Longitude Eaſt and Weſt until they come to the oppoſite Meridian, which can never exceed 180 Degrees.

The Difference of Latitude is the leaſt Diſtance of the Parallels of Latitude of any two Places; ſhewing how far the one of them is to the Northward or Southward of the other.

The Difference of Latitude between any two Places, being both North or both South, is found by ſubtracting the leſs Latitude from the greater; but if one Latitude be North and the other South, their Difference is found by adding both Latitudes together.

In North Latitude ſailing Northerly, or in South Latitude ſailing Southerly, you increaſe your Latitude; but in North Latitude ſailing Southerly, or in South Latitude ſailing Northerly, you decreaſe your Latitude, becauſe you ſail nearer to the Equator from whence the Latitude is reckoned.

Wherefore in North Latitude ſailing Northerly, or in South Latitude ſailing Southerly, the Difference of Latitude added to the Latitude left, gives the Latitude in. But in North Latitude ſailing Southerly, and in South Latitude, ſailing Northerly, the Difference of Latitude ſubtracted from the Latitude left, gives the Latitude in.

When the Latitude decreaſes, and the Difference of Latitude is greater than the Latitude ſailed from, ſubtract the Latitude left from the Difference of Latitude, and the Remainder is the Latitude in, and of a different Name; for in this Caſe it is plain that you have croſſed the Equator.

What has been ſaid, will be rendered familiar to the Learner by the following Examples

Exam. I. What is the Difference of Latitude between London in Latitude 51° 32′ N. and Rome in Latitude 41° 54′ N?

	D.	M.	
From London's Lat.	51	32	N.
Subtract Rome's Lat.	41	54	N.
Remains Diff. of Lat.	9	38	
which mult. by	60		
Gives the Dif. in Miles	578		

Exam. II. A Ship from Latitude 29° 17′ South, ſails Southerly until her Difference of Latitude be 374 Miles, what Latitude is ſhe come to?

	D.	M.	
Latitude ſailed from	29	17	S.
Diff. of Lat. 374 divided by 60, is	6	14	S.
Lat. in —	35	31	S.

Exam. III. Required the Difference of Latitude between Cape Finiſterre and the Cape of Good Hope?

	D.	M.	
Cape Finiſterre's Lat.	42	52	N.
Cape Good Hope's Lat.	34	22	S.
Diff. of Lat. —	77	14	
	60		
Mult. by 60 is	4634	M.	

Exam. IV. A Ship in Latitude 8° 25′ N. ſails South 600 Miles, what Latitude is ſhe in?

	D.	M.	
From Dif. of Lat. 600 Miles, or	10	00	S.
Subtract Lat. left	8	25	N.
The Lat. in —	1	35	S.

In the laſt Example it is plain, that as the Difference of Latitude is more than the Latitude left, the Ship muſt have croſſed the Equator, and conſequently have come into South Latitude.

Note. When one of the Places has no Latitude, or is upon the Equator, then the Lat. of the other Place is their Difference of Latitude, and is always reduced into Miles, by multiplying by 60, becauſe 60 Miles make a Degree of Latitude.

B M

The Longitude of any Place is its Diſtance from the firſt Meridian, reckoned upon the Equator in Degrees Eaſt and Weſt, until it comes to the oppoſite Meridian, and can never exceed 180 Degrees.

Difference of Longitude is an Arch of the Equator, intercepted between the Meridian of two Places, ſhewing how far one of them is to the Eaſtward or Weſtward of the other.

The Difference of Longitude between two Places, being both Eaſt or both Weſt, is found by ſubtracting the leſs Longitude from the greater; but if one be in Eaſt, and the other in Weſt Longitude, the Difference is found by adding both Longitudes together.

Therefore in Eaſt Longitude ſailing Eaſterly, or in Weſt Longitude ſailing Weſterly, the Difference of Longitude added to the Longitude left, gives the Longitude in.

But in Eaſt Longitude ſailing Weſterly, or in Weſt Longitude ſailing Eaſterly, the Difference of Longitude ſubtracted from the Longitude left, gives the Longitude in.

When a Ship ſails Eaſt or Weſt until ſhe paſſes the oppoſite Meridian, or 180 Degrees, ſhe changes her Longitude, or comes into a Longitude of a different Name: and then the Longitude made ſubtracted from 360 Degrees, gives the Longitude in, and of a different Name with the Longitude left, as may be ſeen by the following Examples.

Exam. I. What is the Difference of Longitude between Cape Finiſterre aud Antigua?

	D.	M.
Antigua's Long.	61	49 W.
Cape Finiſterre's Lon.	9	12 W.
Diff. of Long.	52	35
	60	
Diff. in Miles	3157	

Exam. II. A Ship from a Port in Long. 76° 7′ W. ſails Weſtward until her Difference of Longitude be 400 Miles, what Longitude is ſhe in?

	D.	M.
Cape Charles' Long.	76	07 W.
Diff. of Lon. 400M. or	6	40 W.
Long. in ——	82	47

Exam. III. What is the Difference of Longitude between Barcelona and Liſbon?

	D.	M.
Barcelona's Long.	2	18 E.
Liſbon's Long.	9	3 W.
Diff. of Long.	11	21

Exam. IV. A Ship from 15° 40′ E. Long. ſails Weſtward till her Diff. of Long. be 27° 15′, what Longitude is ſhe in?

	D.	M.
Long. left	15	40 E.
Diff. of Long.	27	15 W.
Long. in	11	35 W.

Exam. V. What is the Difference of Longitude between the N. of Japan and the N. Point of St. Chriſtopher's?

	D.	M.
Japan's N. Point	140	25 E.
St. Chriſtopher's N.Pt.	62	42W.
Exceeds 180 Degrees	203	7
	360	
Diff. of Long.	156	53

Exam. VI. A Ship from Long. 160° 20′ W. ſails Weſtward till ſhe differs her Longitude 41° 20′, What Longitude is ſhe in?

	D.	M.
Long. left	160	20W.
Diff. of Long.	41	20W.
	201	40
	360	00
Long. in.	158	20 E

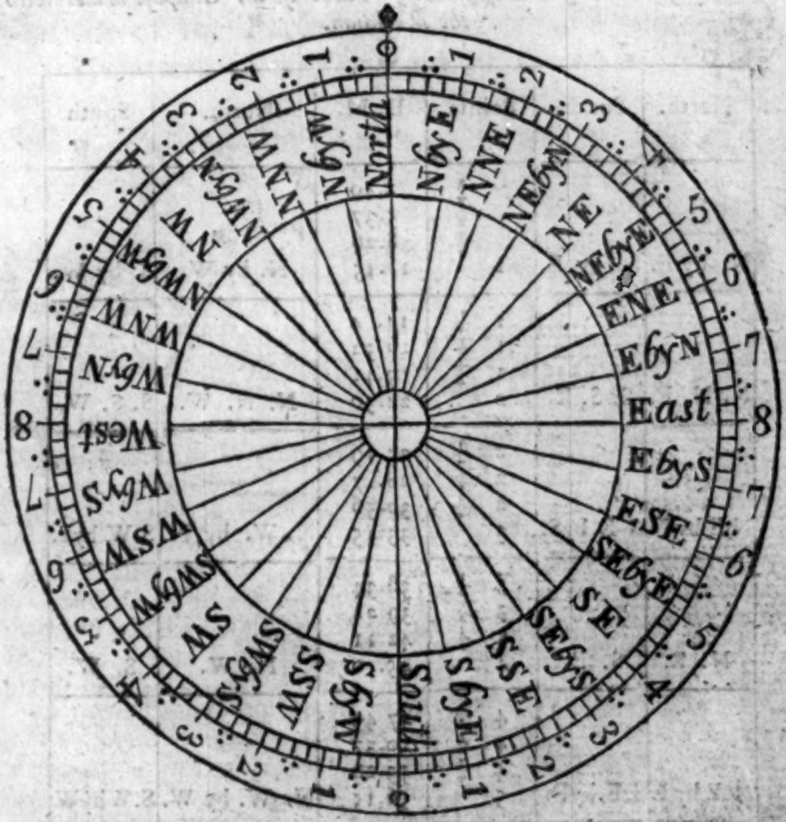
Here it is plain that the Ship has croſſed the oppoſite Meridian, and therefore has come into a Longitude of a different Name.

In ſailing due North or South, the Ship changes her Latitude only, and ſailing due Eaſt or Weſt her Longitude; but ſailing upon any Courſe, ſhe muſt change both Latitude and Longitude.

Ships at Sea are directed from one Place to another by Means of an Inſtrument called the Mariner's Compaſs.

The Mariner's Compaſs is an Artificial Repreſentation of the Horizon of every Place by the Means of a circular Piece of Paper, called a Card, divided like the Horizon into Degrees and Points, which are called Rhumbs. This Card being properly fixed to a Piece of Steel, called the Needle, that has been touched with a Loadſtone, all the Points of the Card will be directed towards the correſponding Point of the Horizon.

THE MARINER's COMPASS.



Hence it follows, that in every Place the North Point of the Card ſhews the Poſition of the Meridian at that Place, and ſome one Rhumb or Point of the Card will coincide with, or be directed along the Track that makes any given Angle with the Meridian; conſequently, by the Help of the Card or Compaſs, a Ship may be kept in any propoſed Track or Courſe.

A Rhumb Line, or Point, is a Right Line drawn from the Center of the Compaſs to the Horizon, and is named from that Point of the Horizon it falls in with.

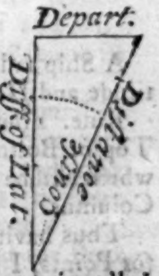
The Courſe is the Angle which any Rhumb Line makes with the Meridian, and is ſometimes reckoned in Degrees, and ſometimes in Points of the Compaſs; ſo that if a Ship ſails upon the ſecond Rhumb or N. N, E. the Courſe is 22 Degrees 30 Minutes: And ſo for any other, as in the following Table, which the Learner ſhould be ſo well acquainted with, or the Compaſs, as to be able readily to tell how many Points any Courſes or Rhumbs are diſtant from the Meridian, or from the Parallel.

A Table of the Angles which every Point of the Compaſs makes with the Meridian.

North.	South.	Points.	D. M.	North.	South
		¼	2.49		
		½	5.37		
		¾	8.26		
N. by E.	S. by E.	1	11.15	N. by W.	S. by W.
		1 ¼	14. 4		
		1 ½	16.52		
		1 ¾	19.41		
N. N. E.	S. S. E.	2	22.30	N. N. W.	S. S. W.
		2 ¼	25.19		
		2 ½	28. 7		
		2 ¾	30.56		
N E by N	S. E. by S.	3	33.45	N. W. by N.	S.W. by S.
		3 ¼	36.34		
		3 ½	39.22		
		3 ¾	42.11		
N. E.	S. E.	4	45. 0	N. W.	S. W.
		4 ¼	47 49		
		4 ½	50.37		
		4 ¾	53.26		
N E by E	S.E. by E.	5	56.15	N. W. by W.	S.W by W
		5 ¼	59. 4		
		5 ½	61.52		
		5 ¾	64.42		
E. N. E.	E. S. E.	6	67.30	W. N. W.	W. S. W.
		6 ¼	70.19		
		6 ½	73. 7		
		6 ¾	75.56		
E. by N.	E. by S.	7	78.45	W. by N.	W. by S.
		7 ¼	81,34		
		7 ½	84.22		
		7 ¾	87.11		
	Eaſt.	8	90. 0	Weſt.	

The Uſe of the Tables of Difference of Latitude and Departure in working any of the Caſes in

PLANE SAILING.



PLANE SAILING is the Art of Navigating a Ship upon Principles deduced from the Notion of the Earth's being an extended Plane, which may anſwer very well in ſhort Voyages near the Equator, and admits of ſix Caſes, which we ſhall work by the Tables of Difference of Latitude and Departure.

Note. Eaſting or Weſting in Plane Sailing is called Departure; Northing and Southing, Difference of Latitude; and the Point or Rhumb the Ship ſails upon, is called the Diſtance. The Angle which that Point makes with the Meridian, is called her Courſe; and what that wants of 90 Degrees or 8 Points, is called the Complement of the Courſe; conſequently, the Courſe and Complement of the Courſe is always 8 Points, or 90 Degrees; ſo that ſubtracting the Courſe from 8 Points, or 90 Degrees, leaves the Complement of the Courſe.

In theſe Tables, the Courſe, if leſs than 4 Points or 45 Degrees, will be found at the Top of the Tables; but if it be more than 4 Points, or 45 Degrees, it will be found at the Bottom of the Tables; and in every Page there are five Columns for Diſtances, marked Diſt. which contain 60 Miles in each Column, the firſt beginning at 1, and ending at 60; the ſecond beginning at 61 and ending at 120; and ſo on to 300 Miles Diſtance; and to each of theſe Columns of Diſtance there belongs two other Columns, ſhewing the Difference of Latitude and Departure to any of thoſe Diſtances, marked Lat. and Dep. in which you are to obſerve, that if your Courſe be found at the Top of the Tables, then you are to take out the Difference of Latitude and Departure, as they are marked at the Top; but if your Courſe be found at the Bottom, then you are to take them as they are marked at Bottom.

When the Courſe is given in Points or Quarter Points, you muſt make uſe of the Table of Difference of Latitude and Departure, calculated for Points, &c. but when it is given in Degrees, or where it is not given at all, you muſt make uſe of the Table of Difference of Latitude and Departure; calculated for Degrees: or ſearch in both Tables until you find a Difference of Latitude and Departure nearly

nearly correſponding with your Difference of Latitude and Departure given; or with the Difference of Latitude or Departure and Diſtance given; and then the Courſe will be found in its proper Column, either at the Top or Bottom.

CASE I.

Courſe and Diſtance given, to find the Difference of Latitude and Departure.

EXAMPLE.

A Ship ſails N. N. E. 241 Miles, I demand her Difference of Latitude and Departure?

Rule. Find the Courſe among the Points or Degrees, either at the Top or Bottom, and find the Diſtance in its Column; oppoſite to which will be found the Difference of Latitude and Departure in their Columns.

Thus having found the Courſe, which is two Points, in the Table for Points, I find my Diſtance 241 in the Column for Diſtances, and right againſt that I find 222,7-Tenths for my Difference of Latitude, and 92,2-Tenths for my Departure.

Note. In all Caſes, if the given Side or Sides, be in Miles, or Miles and Tenth of a Mile, then the Sides, found by the Tables will alſo be in Miles; but if in Leagues, then the Side or Sides found will alſo be in Leagues.

CASE II.

Courſe and Difference of Latitude given, to find the Diſtance run and Departure from the Meridian.

EXAMPLE.

If a Ship ſails S. 48 Degrees Weſt, till her Difference of Latitude be 79 Leagues, I demand her Diſtance and Departure?

Rule. Find the given Courſe at the Top or Bottom of the Tables, either among the Points or Degrees; and in that Page, and right againſt the Difference of Latitude, taken in its Column ſtand the Diſtance and Departure in their Columns.

Thus, the Courſe is 48 Degrees, which I find at the Bottom of the Table of Difference of Latitude and Departure for Degrees; and in the Column marked with Latitude at the Bottom, I look for my Difference of Latitude 79, the neareſt to which is 78,9-Tenths, oppoſite to which ſtand 118 in the Diſtance Column, and 87,7-Tenths in the Departure Column, which is the Diſtance and Departure required.

CASE III.

Courſe and Departure given to find the Diſtance and Difference of Latitude.

EXAMPLE.

If a Ship ſails N. E. by E. ¾ E. from a Port in 3 Degrees 15 Minutes South Latitude, until ſhe departs from her firſt Meridian 412 Miles, what is her Diſtance ſailed, and Latitude in?

Rule. Find your Courſe, which is 5 ¾ Points as before; then look in ſome of the Departure Columns belonging to that Courſe for your Departure, or the neareſt thereto; the Diſtance and Difference of Latitude anſwering to that Departure, will be found in their reſpective Columns.

But in any Caſe, where the given Side is too large to be found in the Tables, divide it by 2, 3, 4, or any other convenient Number, that will make it ſmall enough to be found in the Tables; and then the required Sides, when found, muſt be multiplied by the ſame Number; but the Courſe muſt never be multiplied or divided.

Thus N. E. by E. ¾ E. being 5 ¾ Points, which I find at the Bottom of the Page; and then look into the Departure Column for Half my Departure 206, (the Whole being too large to be found in the Tables) and find 228 for the Diſtance, and 97, 5-Tenths for the Difference of Latitude, which being doubled, gives the Diſtance 456, and the Difference of Latitude 195.

Now, ſince the Ship has ſailed from a South Latitude Northerly,

	D.	M.
From the Latitude ſailed from	3	15 S.
Subtract the Difference of Lat. 195 Miles, or	3	15 N.
	0	0

The Difference being nothing, ſhews that the Ship is upon the Equator.

CASE IV.

Diſtance and Difference of Latitude given, to find the Courſe and Departure.

EXAMPLE.

Suppoſe a Ship ſails between the North and Weſt until her Diſtance be 276 Miles, and her Difference of Latitude be 211,4, what is her Courſe and Departure?

Rule. Seek in the Tables till againſt the Diſtance taken in its Column be found the given Difference of Latitude in one of the following Columns, and adjoining to it ſtands the Departure, which, if leſs than the Difference of Latitude, the Courſe is found at the Top of the Column; but if greater, the Courſe is found at the Bottom.

Now taking the Diſtance, I ſeek till againſt Diſtance 276 ſtands 211,4, which I find ſtanding together under 40 Degrees; oppoſite to which ſtands 177,4; and as my Difference of Latitude is more than my Departure, I find my Courſe at the Top, which is 40 Degrees. Now to reduce this Courſe into Points, I look into the Table following the Compaſs for the neareſt to it, which is 39° 22′; oppoſite to that ſtands 3 ½ Points; and as my Courſe is between the North and Weſt, I ſet down N. W. by N. ½ W. which is my Courſe nearly.

CASE V.

Diſtance and Departure given, to find the Courſe and Difference of Latitude.

EXAMPLE.

From Latitude 50° 13′ N. a Ship, in ſailing between the South and Eaſt 98 Miles, makes her Departure 82 Miles; what Courſe did ſhe ſteer, and what Latitude is ſhe in?

Rule. Seek in the Tables, till againſt the Diſtance taken in its Column be found the given Departure in one of the following Columns; and adjoining to it ſtands the Difference of Latitude; which, if greater than the Departure, the Courſe is found at the Top of the Column; but if leſs, the Courſe is found at the Bottom.

Now ſeeking till againſt the Diſtance 98 ſtands 82, the neareſt will be 82,2, ſigned Departure at Bottom; and here the Difference of Latitude is 53,4, and the Courſe is 57 Degrees: But wiſhing to find them ſtill nearer, I turn to the Table of Points, and there againſt Diſtance 98 ſtands 81, 5, and 54, 4; and as 81, 5 is found in the Column ſigned Departure at Bottom, I there find my Courſe to be 5 Points; therefore, ſince the Ship has ſailed between the South and Eaſt, I take S. 57° E. or S. E. by E. for my Courſe.

Now, from the Latitude ſailed from 50° 13′, take the Difference of Latitude 54, becauſe ſailing Southerly, and there remains 49° 19′, the Latitude in. *Note.* When the Tenths are under 5, they are generally omitted; but if above 5, one is allowed for them.

CASE VI.

Difference of Latitude and Departure here given to find the direct Courſe and Diſtance.

EXAMPLE.

A Ship in Latitude 40° 10′ North, is bound to a Port in Latitude 41° 2′ N. the Departure between the two Places is 33 Miles Eaſt; I demand upon what Courſe ſhe muſt ſail, and how far, to gain her intended Port?

From

	D. M.
From the Latitude the Ship is bound to	41 2 N.
Subtract the Latitude the Ship ſails from	40 10 N.
	0 52 Miles.

Seek in the Tables till the given Difference of Latitude and Departure are found together in their reſeſpective Columns ; then right againſt them will be found the Diſtance in its Column; and the Courſe ſtands among the Degrees or Points at the Top or Bottom of the Column where the Difference of Latitude and Departure were found.

Now taking the Difference of Latitude 52, and Departure 33, I find that the Numbers ſtanding together neareſt to theſe are 52,6, and 32,9 ; and the Diſtance anſwering to theſe is 62 ; and as my Difference of Latitude is greateſt, I find 32 Degrees at the Top for my Courſe ; and ſince the Ship ſails between the North and Eaſt, the Courſe is N. 32° E. or N. E. by N. neareſt, Diſtance 62 Miles.

Having learned theſe neceſſary Caſes concerning a ſingle Courſe, the next is a compound Courſe, commonly called a *Traverſe.*

A *Traverſe* is when a Ship, meeting with contrary Winds, ſails upon ſeveral Courſes.

To reſolve a Traverſe, is to reduce or bring the ſeveral Courſes into one ; the Courſes are known by the Compaſs ; and the Diſtances by the Log ; which, in common Voyages, is heaved once in Two Hours ; but in Ships of War, or ſailing to the Eaſt Indies, every Hour.

In the Steerage, or ſome convenient Place in the Ship, there generally hangs a Table, called the *Log Board*, divided into Seven Columns. In the Firſt are written the Hours of the Day. In the Second, the Knots the Ship runs during Half a Minute ; each of theſe Knots bears the ſame Proportion to a Sea Mile that Half a Minute does to an Hour ; conſequently, ſo many Knots the Ship runs in Half a Minute, ſo many Miles ſhe runs in an Hour. In the Third, the Fathoms ; Ten of which ought to make a Knot. In the Fourth, the Courſes ſteered by the Compaſs. In the Fifth, the Winds. In the Sixth the Lee-Way. And in the Seventh, the Tranſactions of the Day, as in the following Table. Every Day at Noon, the Log Board is tranſcribed into the Log Book, which is divided into Columns exactly like the Log Board ; and the ſeveral Courſes being corrected for the Lee-Way and Variation, and the Diſtance run upon each Courſe being ſet down in the Traverſe Table, ſhews what Difference of Latitude and Departure the Ship has made during the laſt 24 Hours ; and from thence is found the Latitude and Longitude the Ship is in. The Operation is called Doing a Day's Work.

The LOG BOARD.

H.	K.	F.	Courſes.	Winds.	Lee way.	Tranſactions.
2	6		S. W. by S.	N.		
4	5	5				
6	5			N. W.		
8	5					Moderate Gales and
10	4	5	N. E.	N. N. W.		Cloudy Weather; at 8
12	4	5				A. M. ſaw ſeveral
2	4	5				Ships to the Weſtward
4	4	5				
6	4	5				
8	5		S. W by S.	W. N. W.		
10	4	5				
12	4					

Having placed the Courſes and Diſtance run upon each, I begin with the firſt Courſe, S. W. by S. which is 5 Points, and the Diſtance run upon it being ſummed up, is 21,5, or an Half; which being doubled (becauſe the Log was hove every two Hours) is 43. In like Manner proceed with the other Courſes, and then find the Difference of Latitude and Departure for each Courſe and Diſtance.

When the Courſe is to the Southward, the Difference of Latitude, when found, muſt be ſet under the Column marked S. or South; but if to the Northward, in that marked N. or North; likewiſe when the Courſe is to the Eaſtward, the Departure muſt be ſet in the Column marked E. or Eaſt; but if to the Weſtward, in that marked W. or Weſt. Thus the firſt Courſe being S. W. by S. the Difference of Latitude belonging to it is ſet under S. and Departure under W. as in the following Table:

The TRAVERSE TABLE.

Courſes.	Diſt.	N.	S.	E.	W.
S. W. by S.	43		35.8		23.9
N. by E.	45	31.8		31.8	
S. W. by S.	27		22.4		15.0
		31.8	58.2 31.8	31.8	38.9 31.8
	Diff. of Lat. S.		26.4	Dep.W.	7.1

Here

Here the Weſtings being greater than the Eaſtings, the Difference ſhews how far the Ship has got to the Weſtward; and the Southings being greater than the Northings, ſhew how far the Ship has got to the Southward of the Place ſhe ſet out from.

EXAMPLE.

A Ship from the Lizard in Latitude 49° 57′ N. is bound to a Port in Latitude 51° 49′ N. whoſe Departure from the Lizard is 162 Miles Weſt, ſteers the following Courſes as per Log, viz. S. S. W. 54 Miles; W. by S. 39 Miles; N. W. by N. 40 Miles; N. E. by E. 69 Miles; N. N. W. 60 Miles.

Required the direct Courſe and Diſtance made good upon theſe ſeveral Courſes; the Latitude the Ship is in, and what Courſe ſhe muſt ſteer, and how far, to gain her intended Point?

I begin with the firſt Courſe, S. S. W. or Points, under which, in the Tables, and oppoſite to the Diſtance 54 Miles, ſtands 49,9 for my Difference of Latitude, and 20,7 for my Departure; and as the Courſe is between South and Weſt, I ſet the Difference of Latitude in the Column marked S. and the Departure in the Column marked W. In like Manner I proceed with each Courſe and Diſtance; which being found as above, will ſtand as in the following Traverſe Table:

Courſe.	Diſt.	N.	S.	E.	W.
S. S. W.	54		49,9		20,7
W. by S.	39		7.6		38,2
N.W.byN.	40	33,3			22,2
N. E. by E.	69	38,3		57,4	
N.N. W.	60	55,4			23,0
		127,0	57,5	57,4	104,1
		57,5			57,4
Diff.ofLat.Northerly 69,5			Dep. Weſterly 46,7		

Having placed them as above, I add up all the Northings, Southings, Eaſtings, and Weſtings, ſeparately, and ſet down their reſpective Sums at the Bottom of each Column; and as the Weſtings are greater than the Eaſtings, I ſubtract the one from the other, and the Difference, 46,7, ſhews that the Ship has departed ſo much Weſt of her firſt Place.

Again, the Northings being greater than the Southings, I ſubtract the Leſs from the Greater, and the Remainder, 69,5, ſhews how far the Ship is Northward of her firſt Place.

Now having the Difference of Latitude 69,5, and the Departure 46,7, made good upon the ſeveral Courſes, I ſeek in the Tables until they are found ſtanding together in their reſpective Columns, the neareſt to which is 69,5, and 47, ſtanding together under 34 Degrees; and againſt them ſtands 84 for the Diſtance. Hence the Courſe made good upon the ſeveral Courſes, is N. 34 Degrees W. or N. W. by N. nearly, and Diſtance 84 Miles.

To find the direct Courſe and Diſtance to the intended Port.

To the Latitude left 49° 57′ N. add the Difference of Latitude made 69, or 1 Degree 9 Minutes, gives 51° 6′ N. the Latitude in.

	D.	M.		
From the Lat. of the intended Port	51	N.	Departure between the Ports	162,0 W.
Subtract Lat. in	51	N.	Sub. Dep. made	46,7 W.
Diff. of Lat. between Ship and Port	43		Dep. between Ship and Port	115,3 W.

With Difference of Latitude 43, and Departure 115,3, I ſeek in the Tables till they are found ſtanding together in their reſpective Columns; the neareſt to which I find ſtanding over 69 and 70 Degrees, which, being added together, is 139°; Half that Sum is 69° 30′; the Courſe, and Half the Diſtances belonging to theſe Courſes, is 123 Miles.

Hence the direct Courſe from the Ship to her intended Port is N. 69° 30′ W. or nearly W. N. W. ¼ W. Diſtance 123 Miles.

Another Example to exerciſe Traverſe Sailing.

A Ship in the Latitude 17° 10′ N. is bound to a Port in the Latitude of 13° 10′ N. the Departure being 180 Miles Weſtward, ſails theſe Courſes:

S. W. by W. 27 Miles; W. S. W. ½ W. 30 M. W. by S. 25 M. W. by N. 18 M. S. S. E. 32 M. S. S. E. ¼ E. 27 M. S. by E. 25 M. S. 31 M. S. S. E. 39 Miles.

Required her preſent Latitude, and the direct Courſe and Diſtance to the deſired Port?

Anſwer. The preſent Latitude is 14° 21′ N. Courſe S. 62° W. or S. W. by W. ½ W. and Diſtance 150 Miles.

The

The Uſe of the Tables of Difference of Latitude and Departure in working the moſt uſeful Caſes in MERCATOR *and* MIDDLE LATITUDE SAILING.

IN PLANE SAILING the Earth was conſidered as a Plane, repreſenting a Bowling Green, having the Meridians parallel to each other, and, conſequently, the Degrees of Longitude equal in all Places; but this cannot be true, as the Earth is a Sphere or Globe: For,

As the Meridians are great Circles on the Globes, croſſing the Equator, and meeting at the Poles, it is plain that any two of theſe Circles muſt be farther aſunder the farther they are from the Poles; and the greateſt Diſtance between them will be upon the Equator, which is equally Diſtant from each Pole, and there the Diſtance is 60 Miles; but in the Latitnde of 60° North or South, the Diſtance is no more than 30 Miles.

The true Place of a Ship at Sea depends upon its Latitude and Diſtance from ſome noted Meridian; and ſince the Meridian Diſtance, that is, the Diſtance between two Meridians, varies in every Latitude, it is therefore neceſſary that this Diſtance ſhould be reckoned in ſome fixed Latitude, and where the Degrees are of the ſame Magnitude, which can be no where but upon the Equator.

Now, in order to turn this Meridional Diſtance, or Departure, into Longitude, and be able to aſcertain the Ship's Place at Sea, we muſt have Recourſe to Middle Latitude, or Mercator's Sailing, where the Earth is conſidered as a Globe. The principal Caſes are as follow:

Note. In working all Caſes in *Mercator's Sailing*, we muſt make Uſe of the Table of Meridionial Parts, which are Numbers, ſhewing how far each Degree and Minute of Lat. is enlarged, ſo as to keep a due Proportion with the Decreaſing of the Degrees of Long. in every Lat. Therefore, to find the Meridional, or an enlarged Difference of Latitude, between any two Places, firſt, in the Table of Latitude and Longitude, find the Latitudes of the given Places; with which, ſeek for the Degrees on the upper Part of the Table marked D. for Degrees; and in the right or left Hand Columns, for the Minutes, marked at the Top with M. oppoſite to which, and under the Degrees, are the Meridional Parts; and then add, or ſubtract, as the Caſe requires.

Thus, ſuppoſe the Meridional Parts belonging to the Latitude of Cape Clear in Ireland were required? Firſt, find the Latitude of Cape Clear, which is 51° 18′ N. then, in the Table of Meridional Parts,

Parts, ſeek 51° at the Top, and 12′ in the Side Columns; oppoſite to that, and under 51°, ſtands 3588, the Meridional Parts required. The ſame may be obſerved of any Number of Degrees and Minutes required.

To exhibit, at one View, theſe different Kinds of Sailing, I ſhall ſhew how to work the following Caſes, by Mercator's and Middle Latitude Sailing, in oppoſite Columns in the ſame Page; leaving the Mariner to chuſe which of them he thinks proper to find his Difference of Longitude by.

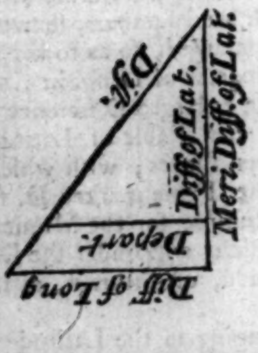
CASE I.

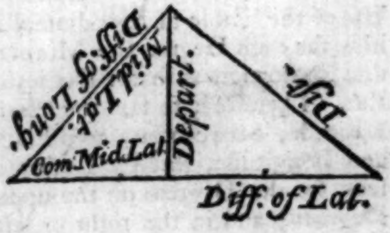
The Latitudes and Longitudes of two Places given, to find the direct Courſe and Diſtance between them.

EXAMPLE.

What is the Courſe and Diſtance between Cape Clear, in Ireland, and St. Mary's, one of the Azores?

	D.	M.				D.	M.		D.	M.
Cape Clear's Lat.	51	18N.	Mer. Parts	3598	Longitude	9	46W.	Latitude	51	18N.
St. Mary's Lat.	36	57N.	Mer. Parts	2389	Longitude	25	40W.	Latitude	36	57N.
Diff. of Lat.	14	21	Mer. Dif. of Lat.	1209	Dif. of Lon.	15	18	Sun's Lat's	88	15
	60					60		Mid. Lat.	44	7
Diff. of Lat. in Miles	861				Dif. in Miles	918			90	0
								Com. Mid. Lat.	45	53





The Difference of Longitude to be worked as Departure.

The Complement of Mid. Lat. to be worked as a Courſe, and the Diff. of Long. as Diſtance.

By

By Mercator's Sailing.

By viewing the Figure, it will evidently appear, that by enlarging the Difference of Latitude, the Difference of Longitude will bear the ſame Proportion to the enlarged Difference of Latitude, that the proper Difference of Latitude bears to the Departure, and the Courſe continues the ſame.

Therefore, ſeek the Meridional Difference of Latitude and Difference of Longitude together, as if they were really proper Difference of Latitude and Departure, and the Courſe will be found among the Points or Degrees, as in Caſe VI. in Plane Sailing.

Then with the Courſe and proper Difference of Latitude, find the Diſtance:

Thus, taking the one Tenth of 1195, the Meridional Difference of Latitude, and 791, the Difference of Longitude, viz. 119,5 and 79,1, the neareſt Numbers to theſe, ſtanding together in the Tables, are 119,4, and 80,5 under 34 Degrees, which is my Courſe.

Then with the Courſe 34°, and one Fourth of 852 the proper Dif. of Lat. 213, I find the neareſt Number to this is 213,1, ſtanding in Lat. Column; the Diſtance to which is 257, and being multiplied by 4, becauſe the Difference of Latitude was divided by 4, gives the Diſtance 1028.

Hence the direct Courſe is S. 34° W. or nearly S. W. by S. Diſtance 1028 Miles.

By Middle Latitude Sailing.

Difference of Longitude is reduced into Departure, by adding both Latitudes together as above, and taking Half their Sum for a Mean or Middle Latitude; this Middle Latitude ſubtracted from 90 Degrees, gives the Complement of Middle Latitude; with this Complement taken as a Courſe, and the Difference of Longitude as Diſtance, find the Departure as in Caſe I. in Plane Sailing.

Having the Departure and the proper Difference of Latitude, the Courſe is found as in Caſe VI. in Plane Sailing.

Thus, taking the Complement of Middle Latitude 45° 54′, or 46 Degrees, as a Courſe, and one Third of my Difference of Longitude 791, 264, as Diſtance, the Departure anſwering to theſe is 189,9, which multiplied by 3, gives 569,7, the Departure; then with one Fourth of the proper Difference of Latitude 852, and Departure 569,7, viz. 213, and 142,4, I ſeek in the Tables, and find the neareſt Numbers to theſe ſtanding together are 213,1, and 143,7, under 34 Degrees, againſt which, in the Diſtance Column, ſtands 257, this being multiplied by 4, gives 1028.

Hence the direct Courſe is S. 34° W. or nearly S. W. by S. Diſtance 1028 Miles, the ſame as before.

CASE II.

The Courſe and Difference of Latitude given, to find the Diſtance and Difference of Longitude.

EXAMPLE I.

A Ship ſails from the Lizard, and makes her Courſe S. 39° W. or nearly S. W. by S. ½ W. and then by Obſervation is in Latitude 45° 31′ N. Required her Diſtance and Difference of Longitude?

By Mercator's Sailing.

	D. M.		
Lizard's Lat.	49 57N.	Mer. Parts	3470
Lat. in	45 31N.	Mer. Parts	3074
Diff. of Lat.	4 26	Mer. Diff. of Lat.	396
	60		
Diff. in Miles	266		

Rule. With the Courſe among the Degrees, and the Difference of Latitude, found in the Column of Lat. find the Diſtance in its Column.

With the Courſe among the Degrees, and the Merid. Diff. of Latitude in the Lat. Column, the Difference of Longitude will be found in the Departure Column.

Thus, under the Courſe 39 Degrees, and againſt Half the Diff. of Lat. 133, ſtands 171 in the Diſtance Column, that doubled gives 342, the Diſtance. Under the ſame Degrees, I look in the Lat. Column for Half my Meridional Difference of Latitude 198, againſt that in the Column of Departure ſtands 160,5, doubled is 321, the Difference of Longitude.

	D. M.
Lizard's Long.	5 14W.
Dif. of Long. 321, or	5 21W.
Long. in	10 35W.

By Middle Latitude Sailing

		D. M.
Lizard's Lat.		49 57 N.
Lat. in		45 31 N.
Sum Latitudes	2)	95 28
Middle Lat.		47 44
		90 00
Com. Mid. Lat.		42 16

Rule. With the Courſe and proper Diff. of Lat. find the Diſt. and Depart. in their Columns; then look for the Com. of Mid. Lat. among the Degrees, as if it was a Courſe, and your Departure in its Column, oppoſite to which, in the Diſt. Column, will be the Difference of Longitude.

Thus, under the Courſe 39°, and againſt Half my Diff. of Lat. 133, in its Column, ſtand Diſt. 171, and Dep. 107.6; theſe being doubled, give 342 for the Diſt. and 215.2 the Departure; then in the Dep. Column, under 42°, the Com. of Mid. Lat. I look for Half my Departure, the neareſt is 107.7; oppoſite to this in the Diſt. Column, ſtands 161, which, being doubled, gives 322, the Difference of Longitude, nearly the ſame as before.

	D. M.
Longitude left,	5 14 W.
Diff. of Long. 322, or	5 22 W.
Long. in	10 36 W.

CASE III.

The Courſe and Diſtance given, to find the Difference of Latitude and Difference of Longitude.

EXAMPLE.

A Ship in Latitude 42° 30′ N. and Longitude 18° 31′ W. ſails S. W. by S. 591 Miles. What Latitude and Longitude is ſhe in?

By Mercator's Sailing.

Rule. With the Courſe found in the Table for Points, and Diſtance, find the Difference of Latitude, and Latitude in, and Meridional Difference of Latitude; with the Courſe, and Meridional Difference of Latitude, taken in the Column of Latitude, the correſponding Departure will be the Difference of Longitude.

Thus, under the Courſe 3 Points, and againſt one-Tenth of the Diſtance 59,1, in the Latitude Column, ſtands 49,1, this multiplied by 10, is 491, the Difference of Latitude. Then,

Lat. left	42 30 N.	Mer. Parts 2822
Diff. 491, or	8 11 S.	
Lat. in	34 19 N	Mer. Parts 2194
		Mer. Diff. of Lat. 628

Now with one Fourth of this Meridional Difference of Latitude 157, found in the Column of Latitude for 3 Points, the Departure correſponding to it, is 105, which being multiplied by 4, is 420, the Difference of Longitude.

	D. M.
Long. left	18 31 W.
Diff. of Long. 420, or	7 0 W.
Long. in	25 31 W.

Note. There being no Tenths in the Diſtances, the neareſt Number is here taken.

By Middle Latitude Sailing.

Rule. With the Courſe found among the Points, and Diſtance, find the Diff. of Lat. and Dep. then find the Lat. in, and Com. of Mid. Lat. in the Table for Degrees, and the Dep. in its Column, and the correſponding Diſtance will be the Difference of Longitude.

Thus, under the Courſe 3 Points, and againſt one-Tenth of the Diſtance 59,1, ſtands Diff. of Lat. 49,1, and Dep. 32,8, theſe being multiplied by 10, gives the Difference of Latitude 491, and Departure 328. Then,

Lat. left		42 30 N.
Diff. of Lat. 491, or		8 11 S.
Lat in		34 19 N.
Sum of Latitudes	2)	76 49
Mid. Lat.		38 24
		90 00
Com. Mid. Lat.		51 36

Now with Half the Dep. 164, I ſeek the neareſt Dep. to this over 51° and 52°, becauſe the Com. of Mid. Lat. is between 51° and 52°, the neareſt to which are 164 and 163 9, the Diſtances correſponding to theſe are 211 and 208, which being added together, gives 419, the Diff. Lon.

Long. left	18 31 W.
Diff. of Long. 419, or	6 59 W.
Long. in	25 30 W.

CASE IV.

CASE IV.

Difference of Latitude and Departure given, to find the Courſe, Diſtance, and Difference of Longitude.

EXAMPLE.

A Ship in Latitude 49° 57′ N. and Long. 5° 14′ W. ſails S. Weſterly till her Departure from the Meridian be 789 Miles, and is then found by Obſervation to be in Lat. 39° 20′ N. Required the Courſe ſteered, Diſtance ſailed, and the Longitude ſhe is in?

By Mercator's Sailing.

Lat. left	49 57 N.	Mer. Parts	3470
Lat. by Obſ.	39 20 N.	Mer. Parts	2571
Diff. of Lat.	10 37	Mer. Diff. Lat.	899
	60		
Diff. in Miles	637		

Rule. The Diff. of Lat. and Dep. being found ſtanding together, give the Courſe among the Degrees, and the Diſt. in its Column. In the Lat. Column belonging to the Degrees of the Courſe, find the Merid. Diff. of Lat. oppoſite to that, in the Departure Column, will be the Difference of Longitude.

Now a ſixth Part of Diff. of Lat. 637, and of the Dep. 789, are 106,1 and 131,5; tke neareſt to theſe are found over 51°, and the Diſtance 169, being multiplied by 6, is 1014 Miles.

In the Lat. Column, over the ſame Degrees, look for a 6th of the Mer. Diff. of Lat. 899, viz. 149,8; againſt that, in the Dep. Column, ſtands 185, which multiplied by 6, is 1110 Miles, the Diff. of Longitude required.

	D. M.
Then to Long. left.	5 14 W.
Add Diff. of Long. 1116, or	18 30 W.
Long. in	23 44

By Middle Latitude Sailing.

Lat. left	49 57 N.
Lat. by Obſ.	39 20
Sum	2) 89 17
Mid. Lat.	44 38
	90 00
Com. Mid. Lat.	45 22

Rule. The Differ. of Latitude and Depar. being found together, will give the Courſe among the Degrees, and the Diſtance and Departure in their Columns.

With the Com. of Middle Lat. among the Degrees, and the Dep. in its Column, find the Diff. of Long. among the Diſtances.

Now a Sixth of the Diff. of Lat. 637, and of the Dep 789, are 106,1, and 131,5, the neareſt to theſe are found over 51°, and the Diſt. is 169, which multiplied by 6, gives 1014 Miles for the Diſtance. Then, with the Com. of Mid. Lat. 45, taken as a Cou. and a Sixth of the Dep. the Diſt. correſponding to theſe are 186, which being multiplied by 6, is 1116 Miles, the Diff. of Long.

	D. M.
Now Long. left	5 14 W.
Diff. of Long. 1116, or	18 36 W.
Long. in	23 50 W.

Hence the direct Courſe is 51° W. or nearly S. W. ½ W. Diſtance 1014 Miles,

I have

I have omitted the odd Minutes in the Complement of Middle Latitude, as the Longitude is found to a ſufficient Degree of Exactneſs without them; but thoſe who deſire to ſee a greater Degree of Accuracy, may ſatisfy themſelves by examining the laſt Edition of the Practical Navigator.

Theſe are all the Caſes that can well happen in a Day's Work at Sea; unleſs it ſo happens that a Ship's Courſe be due Eaſt or Weſt, in which Caſe the Departure is reduced into Longitude, by the following

Rule. With the Complement of the Latitude ſailed in, taken as a Courſe among the Degrees, and the Departure taken in its Column, the correſponding Diſtance will be the Difference of Longitude.

EXAMPLE.

Suppoſe a Ship in Latitude 49° 30′ North or South, ſails directly E. or W. 136,4 Miles, what is her Difference of Longitude?

Now 49° 30′ ſubtracted from 90°, gives 40° 30′, the Complement of the Latitude; and as it lies between 41 and 40 Degrees, I look for my Departure under 40, and find the correſponding Diſtance 212, and under 41, the Diſtance is 208 Miles, which added together is 420; Half of this Sum is 210, the Difference of Longitude required.

How to work a Traverſe has been already ſhewn in Plane Sailing; but it is neceſſary here to ſhew how proper Allowances for Longitude are to be introduced into ſuch Accounts, which is eaſily done by the following Method.

Find the Difference of Latitude and Departure for each Courſe and Diſtance, and ſet them down in the Traverſe Table, as in Plane Sailing.

Find the whole Difference of Latitude aud Departure, and with theſe find the Courſe and Diſtance made good, and the Latitude in, and Meridional Difference of Latitude, if you work by Mercator's Sailing, then with the Courſe and Meridional Difference of Latitude, find the Difference of Longitude.

But if you work by Middle Latitude Sailing, take the Complement of Middle Latitude, and with that and the Departure find the Difference of Longitude.

EXAMPLE.

Yeſterday at Noon we were in Latitude 38° 14′ N. Longitude 25° 56′ W. and have ſince run as per Log. the following Courſes and Diſtances, viz. N. E. by N. ¼ E. 56 Miles; N. N. W. 38. N. W. 38; N. W. by W. 46; S. S. E. 30; S. by W. 20; and N. E. by N. 60 Miles. Required the Ship's Place, and her direct Courſe and Diſtance made good?

Courſes.		N.	S.	E.	W.
N. E. by N. ¼ E.	56	45,0		33,4	
N. N. W.	38	35,1			14,5
N. W. by W.	46	25,6			38,2
S. S. E.	30		27,7	11,5	
S. by W.	20		19,6		3,9
N. E. by N.	60	50,0		33,3	
		155,7	47,3	78,2	56,6
		47,3		56,6	
Diff. of Lat.		108,4	Dep.	21,6	

With the Difference of Latitude and Departure, the Courſe is found to be N. by E. and Diſtance 111 Miles.

By Mercator's Sailing.

	M. D.	
Lat. left	38 14 N.	Mer. Parts 2486
Diff. of Lat.	1 48 N.	
Lat. come to	40 2 N.	Mer. Parts 2625
		Mer. Diff. Lat. 139

Under the Courſe 1 Point, look in the Latitude Column for the Meridional Difference of Latitude, the neareſt is 139,3, oppoſite to that is Departure 27,7, which is the Difference of Longitude.

Long. left	25°	56′W.
Diff. of Long.	27,7, or	28 E.
Long. in	25	28

By Middle Latitude Sailing.

	D. M.
Lat. left	38 14 N.
Lat. in	40 2
Sum Lats.	2) 78 16
Middle Lat.	39 8
	90 0
Com. Mid. Lat.	50 52

Over 51 Degrees, I look in the Departure Column for my Departure, the neareſt is 21,8, oppoſite that in the Diſt. Column ſtands 28, which is my Difference of Longitude.

Hence it appears, that the Ship is in Latitude 40° 2′ N. and Longitude 25° 281′ W. and has run S. by E. 111 Miles.

In like Manner may any Traverſe be worked, either by Middle Latitude or Mercator's Sailing.

The Uſe of the following Tables for finding the Moon's Age, and Time of High Water at any Place.

RULE. Find the Moon's Age in the following Table, ſhewing the mean Times of her Changes, by reckoning the Number of Days ſince her laſt Change; and only obſerving, that the Day on which you find her Age is to be excluded; that is, you are only to count the Days that are compleatly elapſed ſince her laſt Change.

EXAMPLE I.

Required the Time it will be High Water at London, Sept. 1, 1784.

In the Table of Changes, oppoſite to 1784, and under Auguſt, I find that it was New Moon the 16th, at 3 in the Morning, and by reckoning forward to September the 1ſt, find that it is 16 Days ſince her laſt Change, then, in the Table of Times againſt 16, her Age, ſtand 0 H. 56 M. to which I add 3 Hours (the Time of High Water on Full and Change Days at London) gives 3 H. 56 M. ſo that it is High Water 56 Minutes after three in the Morning at London, on the given Day.

Note. The Times of High Water, at full and Change, at any Place, are ſet before the Latitude and Longitudes of theſe Places.

EXAMPLE II.

What Time will it be High Water at London, June the 1ſt, 1786.

Oppoſite to 1786, and under May, in the Table of Changes, I find it was New Moon the 27th Day, at 6 in the Afternoon, and, reckoning forward to June the 1ſt, find that ſhe is almoſt 5 Days old. In the Table of Times, againſt her Age, 5 Days, ſtand 3 Hours, 2 Minutes, this added to 3 Hours, is 6 Hours, 2 Minutes, the Time of High Water at London, in the Evening, on June the 1ſt, 1786.

A TABLE,

Shewing the Times of all the mean Changes of the Moon to the neareſt Hour, from the Beginning of the Year 1778, till the End of the Year 1799, according to the New Stile. And alſo a Table of the Shifting of the Tide, by which will appear the Error in reckoning High Water to be ¾ of an Hour later every Day after Full and Change.

TABLE I.

	Mean Changes					
Year	Jan.	Feb.	March.	April	May	June
	D. H.	D. H.	D. H.	D. H.	D. H.	D. H.
1778	28. 3 m	16. 4 a	28. 3 m	26. 6 a	16. 6 m	24. 7 a
1779	17. 0 a	16. 1 m	17. 2 m	16. 3 m	15. 3 a	14. 4 m.
1780	6. 9 a	5. 10 m	5. 11 a	4. 11 m	3. 12 a	2. 0 a
1781	24. 6 a	25. 7 m	24. 5 m	23. 9 m	22. 9 a	21. 10 m
1782	13. 7 a	12. 4 a	14. 5 m	12. 6 a	12. 6 m	11. 1 m
1783	3. 0 a	2. 1 m	3. 2 a	2. 2 m	1. 3 a 31. 3 m	29. 4 a
1784	22. 9 m	20. 10 a	21. 11 a	19. 12 a	19. 0 a	18. 1 m
1785	10. 6 a	9. 7 m	10. 8 a	9. 9 m	8. 10 a	7. 10 m
1786	29. 4 a	28. 5 m	29. 5 a	28. 6 m	27. 6 a	26. 7 m
1787	18. 12 a	17. 1 a	12. 2 m	17. 3 a	17. 3 m	15. 4 a
1788	8. 0 m	6. 10 a	7. 11 m	5. 12 a	5. 1 a	4. 1 m
1789	26. 7 m	24. 8 a	26. 9 m	24. 10 a	24. 10 m	22 11 a
1790	15. 4 a	14. 3 m	15. 5 a	14. 6 m	13. 6 a	12. 7 m
1791	4. 12 a	3. 1 a	5. 2 m	3. 3 a	3. 4 m	1. 4 a 31. 5 m
1792	13. 10 a	22. 11 m	22. 12 a	21. 1 a	21. 1 m	19. 2 a
1793	12. 7 m	10. 8 a	11. 9 m	10. 10 a	10. 1 a	8. 11 a
1794	1. 4 a 31. 5 m		1. 6 a 31. 6 m	29. 7 a	29. 7 m	27. 8 a
1795	20. 1 a	19. 2 m	20. 3 a	19. 4 m	18. 4 m	17. 5 m
1796	9. 10 a	8. 11 m	8. 12 a	7. 0 a	7. 1 m	5. 1 a
1797	21. 7 a	26. 8 m	27. 9 a	26. 10 m	25. 10 a	24. 11 m
1798	17. 4 m	5. 5 a	17. 6 m	15. 7 a	15. 7 m	13. 8 a
1799	6. 1 a	5. 2 m	6. 3 a	5. 4 m	4. 5 a	3. 5 m

TABLE II.

Moon's Age.	Times Ant. High Water later than Full and Change each Day.		
Days	H.	M.	
1	0	44	
2	1	22	
3	1	56	
4	2	28	
5	3	2	
6	3	40	Afternoon.
7	4	24	
8	5	12	
9	6	4	
10	7	4	
11	8	8	
12	9	12	
13	10	15	
14	11	16	
15	12	12	

After Change the Moon comes to the Meridian in the Afternoon.

To find the Time of High Water.

Firſt, find the Moon's Age in the firſt Table, by counting the Days ſince her laſt Change, and againſt her Age, in the ſecond Table, ſtand Hours and Minutes, to which add the Time making High Water at Full and Change at that Place, which gives the Time of High Water any Day there.

A Table

A TABLE,

Shewing the Times of all the mean Changes of the Moon to the neareſt Hour, from the Beginning of the Year 1778, till the End of the Year 1799, according to the New Stile. And alſo a Table of the Shifting of the Tide, by which will appear the Error in reckoning High Water to be ¾ of an Hour later every Day after Full and Change.

A TABLE

	Mean Changes.					
Year	July	Aug.	Sept.	October.	Novem.	Decem.
	D. H.	D. H.	D. H.	D. H.	D. H.	D. H.
1778	24. 8m.	22. 9 a	21. 9m	20. 10m	19. 11m	18. 12 a
1779	13. 5 a	12. 6m	10. 6 a	10. 7m	8. 8 a	8. 9m
1780	2. 1m 31. 2 a	30. 3m	28. 3 a	28. 4m	26. 5 a	26. 6m
1781	20. 11a	19. 0 a	17 12 a	17. 1 a	16. 2m	15. 3 a
1782	10. 8m	8. 9m	7. 2 a	6 10 a	5. 11m	4. 12 a
1783	29. 5m	27. 6 a	26. 6m	25. 7 a	24. 8m	23. 9 a
1784	17 2 a	16. 3m	14. 3 a	14 4m	12. 5 a	12. 6m
1785	6 11 a	5. 0 a	4. 1m	3. 1 a	2. 2m	1. 3 a 31. 3m
1786	15. 8 a	24. 9m	22. 9 a	22. 10m	20. 11 a	20. 0 a
1787	15. 5m	13. 6 a	12. 6m	11. 7 a	10. 8m	9. 9 a
1788	3 2 a	2. 3m 31. 4 a	30. 4m	29. 5 a	28. 6m	27. 7 a
1789	22. 0 a	21. 1m	19. 1 a	19. 2m	17. 3 a	17. 4m
1790	11. 8 a	10. 9m	8. 9 a	8. 10m	6. 11a	6. 0 a
1791	30. 6 a	29. 7m	27. 7 a	27. 8m	25. 9 a	25. 10m
1792	19. 3m	17 4 a	16. 4m	15. 5 a	14. 6m	13. 7 a
1793	8. 0 a	7 1m	5. 1 a	5. 2m	3. 3 a	3. 4m
1794	27. 9m	25. 10a	24. 10m	23. 11a	22. 0 a	22. 1m
1795	16. 6 a	15. 7m	13. 7 a	13. 8m.	11. 9 a	11. 10m
1796	5. 2m	3. 3 a	2. 4m	1. 4 a 31. 5m	29. 6 a	29. 7m
1797	23. 12 a	22. 1 a	21. 1m	20. 2 a	19. 3m	18. 4 a
1798	13. 9m	11. 10a	10 10m	9 11 a	8. 0 a	8. 1m
1799	2. 6 a	1. 7m 30. 8 a	29. 8m	28. 9 a	27. 10m	26. 11 a

TABLE II.

Moon's Age.	Times Anſw. High Water later after Full and Change each Day.	
Days.	H.	M.
16	0	56
17	1	24
18	2	8
19	2	40
20	3	14
21	3	52
22	4	36
23	5	22
24	6	16
25	7	18
26	8	22
27	9	[illegible]6
28	10	30
29	11	32
29½	12	12

After Midnight.

After Full Moon ſhe comes to the Meridian after Midnight.

Note, *a* ſtands for Afternoon, and *m* for Morning.

In ſome Places it is High Water on the Shore while the Tide continues to flow in the Stream or Offing. If it runs 3 Hours longer it is called the Tide and Half Tide; an Hour and an Half makes Tide and Quarter Tide; Three Quarters of an Hour makes Tide and Half Quarter Tide, &c

EXAMPLE III.

At what Time will it be High Water at St. Helen's, Sept. the 4th, 1784?

Againſt 1784, and under Auguſt, I find it is new Moon the 16th, at 3 in the Morning, and reckoning on to Auguſt the 4th, gives 19 Days for the Moon's Age; oppoſite to that, in the Table of Times, ſtand 2 Hours 40 Minutes; this being added to 9 Hours, the Time of High Water at Full and Change at St. Helen's, gives 11 Hours 40 Minutes, for the Time paſt Midnight, when it is High Water there.

In like Manner may the Time of High Water be found at any other Place. Whoever will compare theſe Examples with the Methods uſed in other Books of this Kind, will find a conſiderable Difference, as they frequently give the Moon's Age ſeveral Days, and of High Water, Hours wide of the Truth; indeed, on Account of the Irregularities in the Moon's Motion, the Times of her Change may differ Half a Day from the Truth, and the Time of High Water 30 Minutes, but ſeldom more, if the Sea is not greatly influenced by the Wind.

The Table of Times of the Shifting of the Tides will alſo ſhew the Error of reckoning High Water to be Three Quarters of an Hour later every Day; for the mean Period of the Moon, from Change to Change, is 29 Days, 12 Hours, 44 Minutes; in which Time the Tides make a Period through the 24 Hours, making High Water later each Day, as in the Table of Times, the mean Time from Tide to Tide being about 12 Hours 24 Minutes.

NOTE. The Time of High Water is ſet before Latitude and Longitude of Places in the Table.

Among Pilots it is cuſtomary to reckon the Time of Flood, or High Water, by the Point of the Compaſs the Moon bears on at that Time, allowing three Quarters of an Hour for each Point. Thus, in Places where it is Flood at Noon on the Days of Full and Change, the Tide is ſaid to flow North and South, or at 12 o'Clock. In Places where the Moon bears 1, 2, 3, 4, or more Points to the Eaſt or Weſt of the Meridian, when it is High Water on the ſame Days, the Tide is ſaid to flow to ſuch a Point; ſo if the Moon bears S. E. at Flood, it is ſaid to flow S. E. and N. W. or 3 Hours before the Meridian, that is, 9 o'Clock; if ſhe bears S. W. it flows S. W. and N. E. or at 3 Hours after the Meridian; and in like Manner for other Points of the Moon's bearing, as in the following Table:

A TABLE *of the Bearings of the* MOON *at the Time of High Water, with the Time of thoſe Bearings at the following Places:*

When the Moon bears as follows.		H.	
N. and	S.	12	Iſle of Alderney, Gibraltar, Southampton, Beachy, Sheerneſs, a Sand called Kentiſh Knock, a Sand called the Swin, at the Mouth of the Thames.
N. by E.	S. by W.	0¾	or 45 Minutes paſt 12, Rocheſter, Fluſhing, Malden, Nore.
N. N. E.	S. S. W.	1½	or 30 Minutes paſt 1, Bell Iſle, Tinmouth, Graveſend, Holyhead.
N. E. by N.	S. W. by S.	2¼	or 15 Minutes paſt 2, Berwick, Liſbon, St. Andrew's, Conquet.
N. E.	S. W.	3	Whitby, London, Amſterdam, Bourdeaux, Bay of Biſcay.
N. E. by E.	S. W. by W.	3¾	Breſt, Huntcliff, Iſle of Bas at the Maes, Scarborough.
E. N. E.	W. S. W.	4½	In Breſound, Uſhant, Scilly, Cork, C. Clear
E. by N.	W. by S.	5¼	Humber Mouth, at the Spurn, Torbay, Start, Point.
E.	W.	6	Hull, Wells, Weymouth, Plymouth, Ramhead.
E. by S.	W. by N.	6¾	Briſtol, Portland Road, Lynn, Foulneſs, Foy.
E. S. E.	W. N. W.	7½	Lizard, Land's End, Falmouth, Penryn, C. Barfleur.
S. E. by E.	N. W. by W.	8¼	Eddiſtone, Yarmouth, Needles, Fly, Dublin, I. of Ely.
S. E.	N. W.	9	Iſle of Man, Iſle of Wight, E. End, Caſkets, Caen, St. Helen's.
S. E. by S.	N. W. by N.	9¾	N Foreland, Dungeneſs, Dunnoſe, Shoreham
S. S. E.	N. N. W.	10½	Downs, Deal, Dover, S. Foreland.
S. by E.	N. by W.	11¼	Margate, Harwich, Roſe, Pool, Portſmouth, Spithead, Calais,
S.	N.	12	Dunkirk, Embden, R. Elbe, Coaſt of Flanders, Oſtend.

Note. The Current in the Downs generally runs 7¼ Hours to the North; and 5¼ Hours to the Southward; at Dover the Tide from the Channel runs Northward 7¼ Hours; and from the North 5 H. 10 M. at the Full and Change of the Moon. The Tides ſet in the Downs N. N. E. and S. S. W. nearly. It is high Water at London 46 Minutes after Two at Full and Change by the Shore.

To work an Obſervation, or to find the Latitude of a Place by the Tables of the Sun or Star's Declination and the Zenith Diſtance.

The Latitude of any Place is its Diſtance from the Equator, either North or South, counted in Degrees, &c. upon an Arch of the Meridian, contained between the Zenith, or that Point directly over your Head and the Equator. It can never exceed 90 Degrees, and is found by taking the Altitude or Height of the Sun or Star above the Horizon of the Sea with a Quadrant, when on the Meridian or due North or South of the Place of Obſervation.

This Meridian Altitude, corrected for Dip of the Horizon, and Refraction, and 16 Minutes the Sun's Semi-diameter added thereto, gives the Altitude of his Centre, which being ſubtracted from 90° gives the Zenith Diſtance or the Number of Degrees, &c. the Centre of the Object is from the Point over your Head; with which, and knowing how far the Object is to the North or South of the Equator, which is called Declination, the Latitude is found by the Meridian Altitude of any Celeſtial Object as follows:

Firſt, If the Sun or Star be South when obſerved, call the Zenith Diſtance South; but if North, call it North.

Then if the Zenith Diſtance and Declination be of contrary Names; that is, if the Sun or Star comes to the Meridian in the North, and hath South Declination, or to the South, and hath North Declination, the Zenith Diſtance, added to the Declination, gives the Latitude of the Place of Obſervation; and of the ſame Name the Declination is of, whether North or South.

Secondly, When the Zenith Diſtance and Declination are of the ſame Name; that is, when the Sun or Star comes to the Meridian in the North, and hath North Declination; or to the South and hath South Declination, ſubtract the Leſſer from the Greater, and the Remainder is the Latitude; and to know whether it is North or South to obſerve this general Rule:

When the Declination is greater than the Zenith Diſtance, the Latitude is of the ſame Name with the Declination; but if leſs, of a contrary Name.

Note. Firſt, When the Sun or Star is on the Equator, or hath no Declination, the Zenith Diſtance is the Latitude of the Place, and of a contrary Name to the Zenith Diſtance.

Secondly, When the Sun or Star is in the Zenith, the Declination is the Latitude, and of the ſame Name as the Declination is of. For it is evident, that as they are equally diſtant from the Equator, and on the ſame Side of it, conſequently if the Declination be North, the Latitude will be alſo North, and if South, South.

Thirdly, When the Altitude of the Sun's lower Limb is taken by a Back Obſervation, the Sun's Semidiameter muſt be ſubtracted from the Obſerved Altitude.

EXAMPLE

EXAMPLE I.

Being at Sea the 27th of May, 1784, the Sun's Meridian Altitude was found to be 57° 35′, and it was South of me; what Latitude was I in?

	90° 0′
Meridian Altitude	57 35 N
Zenith Diſtance	32 25 S.
Sun's Decl. in Table for May 27 is	21 21 N
Latitude in	53 46N

EXAMPLE II.

Being at Sea the 24th of July, 1783, the Meridian Altitude of the Sun was 27° 13′, being North of me; required the Latitude in?

	90° 0′
Meridian Altitude	27 13 N.
Zenith Diſtance	62 47 N.
Sun's Decl. in Table for July 24th	19 51 N.
Latitude in	42 56 S.

EXAMPLE III.

Being at Sea the 14th of January, 1783, the Sun's Meridian Altitude was found 72° 17′ N. What was the Latitude of the Place of Obſervation?

	90° 00′
Meridian Altitude	72 17 S.
Zenith Diſtance	18 43 S.
Declination	23 16 S.
The Latitude in	4 33 N,

In this Caſe it is plain, that the Obſerver was between the Sun and the Equator.

EXAMPLE IV.

Being at Sea the 4th of May, 1784, I obſerved the bright Star Fomelhaut 27° 21′ above the Horizon of the Sea, and it was North of me; required the Latitude in?

	90° 00′
Meridian Altitude	27 21
Zenith Diſtance	52. 39N.
Fomelhaut'sDecl.	30 46 S.
The Latitude in	21 53 S.

The foregoing Rules are for obſerving by the Sun or Stars when they are at their greateſt Altitude, or upon the Meridian above the Pole; but as in ſome Parts of the Earth the Sun does not ſet for ſeveral Days; and ſome Stars never ſet, in that Caſe they may be obſerved upon the Meridian twice in the 24 Hours, that is, once at their greateſt Height as before, and again when they are at their loweſt, or upon the Meridian below the Pole; to work which Obſervations take the following

Rule. Add the Complement of the Declination to the Meridian Altitude, the Sum is the Latitude of the ſame Name with the Declination.

EXAMPLE V.

At Sea I took the Altitude of the North Pole Star, when on the Meridian below the Pole, and found it 46° 21′; required the Latitude?

The

The Meridian Altitude	46° 21'N.
Com. Declination	1 54
The Latitude in	48 13 N.

In the following Examples the Corrections for Dip and Refraction are introduced.

EXAMPLE VI.

By a fore Obſervation the Altitude of the Sun's lower Edge was found by Hadley's Quadrant to be 40° 20' S. when his Declination was 9° 56' N. the Eye being 30 Feet above the Horizon.

Required the Latitude of the Place.

Obſ. Alt. Sun's low. Edge	40° 20' S.
Semi-diam. to be added	0 16
App. Alt. Sun's Centre	40 36
Dip. of Hor, to be ſubtr.	0 05
App. Alt. Cor. by the Dip.	40 31
Refract. to be ſubtr.	0 01
True Alt. of Sun's Centre	40 30
True Zenith Diſtance	49 30 S.
Declination	9 56 N:
Latitude	59 26 N.

EXAMPLE VII.

By a back Obſervatien with Hadley's Quadrant the apparent Altitude of the Sun's lower Edge was 25° 12' S. when his Declination was 21° 14' S. and the Eye 40 Feet above the Horizon. In what Latitude was the Obſervation made?

Obſ. Alt. Sun's low. Edge	25° 12' S.
Semi-diam. to be ſubtr.	0 16
App. Alt. Sun's Centre	24 56
Dip. of Hor. to be added	0 06
App. Alt. Cor. by the Dip.	25 02
Refract to be ſubt.	0 02
True Alt. of Sun's Centre	25 00
True Zenith Diſtance	65 00 S.
Declination	21 14 S.
Latitude	43 46 N.

EXAMPLE VIII.

Suppoſe the Eye of an Obſerver at 35 Feet above the Water, ſhould, with Hadley's Quadrant, by a fore Obſervation, find the Altitude of Sirius 53° 35' S. when it paſſed the Meridian, having before Hand ſet his Watch, and found the Time of Sirius' Paſſage; required the Latitude of the Place of Obſervation?

Obſ. Alt. of Sirius	53° 35' 00''N.
Dip. of Hor. to be ſub.	0 05 39
Ap. Alt. above Hor.	53 26 21
Refract. to be ſub.	0 00 42
True Alt. of Sirius	53 28 39
True Zen. Diſt.	36 31 21 S.
Sirius' Declinat.	16 25 5 S.
Latitude	20 06 16 N.

EXAMPLE IX.

Suppoſe on the 12th of June, 1784, an Obſerver in an high Northern Lat. his Eye being 28 Feet high, obſerved the Altitude of the Sun's lower Limb on the Meridian below the Pole, to be 8° 15'North, by a fore Obſervation; required the Latitude?

Ap. Alt. Sun's low. Limb	8° 15'N.
Semi-diam. added	16
App. Alt. Sun's Centre	8 31
Dip. of Hor. ſub.	5
Sun's Alt. Cor. by Dip.	8 26
Refrac. ſub.	6
True Alt. Sun's Centre	8 20
Comp. Sun's Decl.	66 47
Latitude in	75 7 N.

A Table of the Refraction of the Heavenly Bodies, to be ſubtracted from the obſerved Altitude.

Elevation of the Eye above Sea in Feet.	Dip of the Hor. of the Sea.	App Alt.	Refrac.	App. Alt.	Refrac.	App. Alt.	Ref.	App Alt.	Refr.	App Alt.	Ref.
	′ ″	° ″	′ ″	° ′	′ ″	° ″	′ ″	° ″	′ ″	° ″	″ ′
1	0 57	0	33 0	4 50	10 11	10 30	5 0	26 0	1 56	59 0	0 34
2	1 21	5	32 10	5 0	9 54	10 45	4 53	27	1 51	60	33
3	1 39	10	31 22	5 10	9 38	11 0	4 47	28	1 47	61	32
4	1 55	15	30 35	5 20	9 23	11 15	4 40	29	1 42	62	30
5	2 08	20	29 50	5 30	9 8	11 30	4 34	30	1 38	63	29
6	2 20	30	28 22	5 40	8 54	11 45	4 29	31	1 35	64	28
7	2 31	32	28 5	5 50	8 41	12 0	4 23	32	1 31	65	26
8	2 42	36	27 30	6 0	8 28	12 20	4 16	33	1 28	66	25
9	2 52	40	27 0	6 10	8 15	12 40	4 9	34	1 24	67	24
10	3 1	50	25 42	6 20	8 3	13 0	4 3	35	1 21	68	23
12	3 18	1 0	24 29	6 30	7 51	13 20	3 57	36	1 18	69	22
14	3 34	1 10	23 20	6 40	7 40	13 40	3 51	37	1 16	70	21
16	3 49	1 20	22 15	6 50	7 30	14 0	3 45	38	1 13	71	19
18	4 3	1 30	21 15	7 0	7 20	14 20	3 40	39	1 10	72	18
20	4 16	1 40	20 18	7 10	7 11	14 40	3 35	40	1 8	73	17
22	4 28	1 50	19 25	7 20	7 2	15 0	3 30	41	1 5	74	16
24	4 40	2 0	18 35	7 30	6 53	15 30	3 24	42	1 3	75	15
26	4 52	2 10	17 48	7 40	6 45	16 0	3 17	43	1 1	76	14
28	5 3	2 20	17 4	7 50	6 37	16 30	3 10	44	59	77	13
30	5 14	2 30	16 24	8 0	6 29	17 0	3 4	45	57	78	12
35	5 39	2 40	15 45	8 10	6 22	17 30	2 59	46	55	79	11
40	6 2	2 50	15 9	8 20	6 15	18 0	2 54	47	53	80	10
45	6 24	3 0	14 36	8 30	6 8	18 30	2 49	48	51	81	9
50	6 44	3 10	14 4	8 40	6 1	19 0	2 44	49	49	82	8
60	7 23	3 20	13 34	8 50	5 55	19 30	2 39	50	48	83	7
70	7 59	3 30	13 6	9 0	5 48	20 0	2 35	51	46	84	6
80	8 32	3 40	12 40	9 10	5 42	20 30	2 31	52	44	85	5
90	9 3	3 50	12 15	9 20	5 36	21 0	2 27	53	43	86	4
100	9 33	4 0	11 51	9 30	5 31	21 30	2 24	54	41	87	3
		4 10	11 29	9 40	5 25	22 0	2 20	55	40	88	2
		4 20	11 8	9 50	5 20	23 0	2 14	56	38	89	1
		4 30	10 48	10 0	5 15	24 0	2 7	57	37	90	0
		4 40	10 29	10 15	5 7	25 0	2 2	58	35		

A TABLE OF AMPLITUDES.

Lat.	DECLINATION IN DEGREES.																							Lat.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	23.29	
	D.M.	D.M.	D.M.	D.M.	D.M.	D.M.	D.M.	D.M.	D.M.	D.M.	D.M.	D.M.	D.M.	D.M.	D.M.	D.M.	D.M.	D.M.	D.M.	D.M.	D.M.	D.M.	D.M.	D.M.	
1	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	16.0	17.0	18.0	19.0	20.0	21.0	22.0	23.0	23.29	1
2	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	16.1	17.1	18.1	19.1	20.1	21.1	22.1	23.1	23.30	2
3	1.0	2.0	3.0	4.0	5.0	6.0	7.1	8.1	9.1	10.1	11.1	12.1	13.1	14.1	15.1	16.1	17.1	18.1	19.1	20.2	21.2	22.2	23.2	23.31	3
4	1.0	2.0	3.0	4.0	5.0	6.1	7.1	8.1	9.1	10.1	11.2	12.1	13.2	14.2	15.2	16.2	17.2	18.2	19.3	20.3	21.3	22.3	23.3	23.33	4
5	1.0	2.0	3.0	4.1	5.1	6.1	7.2	8.2	9.2	10.2	11.3	12.3	13.3	14.3	15.4	16.4	17.4	18.4	19.4	20.5	21.5	22.5	23.5	23.35	5
6	1.0	2.0	3.1	4.1	5.1	6.2	7.2	8.2	9.3	10.3	11.3	12.4	13.4	14.4	15.5	16.5	17.5	18.6	19.6	20.7	21.7	22.7	23.8	23.38	6
7	1.0	2.1	3.1	4.2	5.2	6.2	7.3	8.3	9.4	10.4	11.5	12.5	13.6	14.6	15.7	16.7	17.8	18.8	19.9	20.9	21.10	22.10	23.11	23.40	7
8	1.0	2.1	3.1	4.2	5.3	6.3	7.4	8.4	9.5	10.5	11.6	12.7	13.8	14.8	15.9	16.10	17.10	18.11	19.11	20.12	21.13	22.13	23.14	23.44	8
9	1.0	2.1	3.2	4.3	5.3	6.4	7.5	8.6	9.7	10.7	11.8	12.9	13.10	14.10	15.11	16.12	17.13	18.14	19.15	20.16	21.17	22.17	23.18	23.49	9
10	1.1	2.2	3.3	4.4	5.5	6.6	7.7	8.8	9.9	10.10	11.11	12.12	13.13	14.14	15.15	16.16	17.17	18.18	19.19	20.20	21.21	22.22	23.23	23.54	10
11	1.1	2.2	3.3	4.4	5.5	6.6	7.7	8.9	9.10	10.11	11.11	12.13	13.15	14.16	15.17	16.18	17.20	18.21	19.22	20.24	21.25	22.26	23.28	23.58	11
12	1.1	2.3	3.4	4.5	5.7	6.8	7.9	8.11	9.12	10.13	11.15	12.19	13.18	14.19	15.21	16.22	17.23	18.25	19.26	20.28	21.29	22.31	23.33	24.3	12
13	1.2	2.3	3.5	4.6	5.8	6.10	7.11	8.12	9.14	10.15	11.17	12.19	13.21	14.22	15.24	16.26	17.28	18.30	19.31	20.33	21.35	22.37	23.38	24.8	13
14	1.2	2.3	3.5	4.7	5.9	6.11	7.13	8.15	9.17	10.18	11.20	12.22	13.24	14.26	15.28	16.30	17.32	18.34	19.36	20.38	21.41	22.43	23.45	24.15	14
15	1.2	2.4	3.6	4.8	5.11	6.13	7.15	8.17	9.19	10.21	11.23	12.25	13.28	14.30	15.38	16.35	17.37	18.40	19.42	20.44	21.46	22.49	23.51	24.22	15
16	1.2	2.5	3.7	4.10	5.12	6.15	7.17	8.19	9.22	10.24	11.27	12.29	13.32	14.34	15.32	16.40	17.42	18.45	19.48	20.51	21.53	22.56	23.59	24.29	16
17	1.2	2.5	3.8	4.11	5.13	6.16	7.19	8.22	9.25	10.27	11.30	12.33	13.36	14.39	15.42	16.45	17.48	18.51	19.54	20.57	22.0	23.4	24.7	24.38	17
18	1.3	2.6	3.9	4.12	5.15	6.19	7.22	8.25	9.28	10.30	11.34	12.38	13.41	14.44	15.46	16.51	17.54	18.57	20.1	21.5	22.8	23.12	24.15	24.46	18
19	1.3	2.7	3.10	4.13	5.17	6.21	7.24	8.28	9.31	10.34	11.38	12.42	13.47	14.50	15.53	16.57	18.1	19.5	20.8	21.12	22.16	23.20	24.24	24.56	19
20	1.4	2.8	3.12	4.15	5.19	6.23	7.27	8.31	9.35	10.38	11.43	12.47	13.51	14.55	16.0	17.4	18.8	19.12	20.16	21.20	22.25	23.29	24.34	25.5	20
21	1.4	2.8	3.13	4.17	5.21	6.26	7.30	8.34	9.39	10.43	11 48	12.52	13.57	15.1	16.5	17.10	18.15	19.20	20.24	21.29	22.34	23.39	24.44	25.16	21
22	1.4	2.9	3.14	4.19	5.23	6.28	7.33	8.38	9.43	10.47	11.53	12.58	14.3	15.8	16.13	17.18	18.23	19.28	20.33	21.39	22.44	23.50	24.55	25.27	22
23	1.5	2.10	3.15	4.21	5.26	6.31	7.36	8.42	9.47	10.52	11.58	13.3	14.9	15.14	16.19	17.25	18.31	19.37	20.43	21.49	22.55	24.1	25.7	25.39	23
24	1.5	2.11	3.17	4.23	5.28	6.34	7.40	8.45	9.51	10.57	12.3	13.9	14.17	15.21	16.27	17.34	18.40	19.46	20.52	21.59	23.6	24.12	25.19	25.51	24
25	1.6	2.12	3.18	4.25	5.31	6.37	7.43	8.50	9.56	11.2	12.9	13.16	14.23	15.29	16.35	17.42	18.49	19.56	21.3	22.10	23.18	24.24	25.32	26.5	25
26	1.7	2.13	3.20	4.27	5.33	6.41	7.58	8.54	10.1	11.8	12.15	13.23	14.30	15.37	16.44	17.51	18.59	20.6	21.14	22.22	23.30	24.38	25.46	26.19	26
27	1.7	2.14	3.22	4.29	5.36	6.44	7.51	8.59	10.6	11.14	12.22	13.30	14.38	15.45	16.53	18.1	19.9	20.17	21.26	22.34	23.43	24.51	26.0	26.34	27
28	1.8	2.16	3.24	4.32	5.40	6.48	7.56	9.04	10.12	11.20	12.29	13.37	14.46	15.54	17.3	18.11	19.20	20.29	21.38	22.48	23.57	25.6	26.16	26.49	28
29	1.8	2.17	3.25	4.34	5.43	6.52	8.0	9.09	10.18	11.27	12.36	13.45	14.54	16.3	17.12	18.22	19.31	20.41	21.51	23.1	24.11	25.22	26.32	27.6	29
30	1.9	2.18	3.28	4.37	5.46	6.56	8.5	9.15	10.24	11.33	12.42	13.53	15.3	16.13	17.23	18.33	19.43	20.54	22.5	23.16	24.27	25.38	26.49	27.23	30
31	1.10	2.20	3.30	4.40	5.50	7.0	8.10	9.21	10.31	11.41	12.52	14.2	15.13	16.23	17.34	18.45	19.56	21.8	22.19	23.31	24.43	25.55	27.7	27.42	31
32	1.10	2.21	3.32	4.43	5.54	7.5	8.16	9.27	10.38	11.49	13.0	14.11	15.23	16.34	17.46	18.58	20.10	21.22	22.34	23.47	25.0	26.13	27.26	28.1	32
33	1.11	2.23	3.35	4.46	5.58	7.9	8.20	9.33	10.45	11.57	13.9	14.21	15.33	16.45	17.58	19.11	20.24	21.37	22.50	24.4	25.18	26.32	27.46	28.23	33

A TABLE OF AMPLITUDES.

Lat.	DECLINATION IN DEGREES.																							Lat.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	10	17	18	19	20	21	22	23	23.29	
	D. M.	D. M.	D. M.	D. M.	D. M.	D. M.	D. M.	D. M.	D. M	D. M.	D. M	D. M.	D. M	M. D.	D. M.	D. M.	D. M.	D. M.	D. M	D. M.	D. M.	D. M.	D. M.	D. M.	
34	1.12	2.25	3.37	4.50	6. 2	7.15	8.27	9.39	10.52	12. 5	13.18	14.31	15.44	16.57	18.11	19.25	20.39	21. 5	23. 7	24.21	25.36	20.51	28. 7	28.44	34
35	1.13	2.27	3.40	4.53	6. 6	7.20	8.33	9.47	11. 0	12.14	13.28	14.42	15.55	17.11	18.25	19.40	20.55	22.10	23.25	24.10	25.56	27.13	28.29	29. 7	35
36	1.14	2.28	3.43	4.57	6.11	7.25	8.39	9.54	11. 9	12.23	13.38	14.53	16. 9	17.24	18.39	19.55	21.11	22.27	23.43	25. 0	26.18	27.35	28.53	29.30	36
37	1.15	2.30	3.45	5. 0	6.15	7.31	8.46	10. 2	11.17	12.33	13.49	15. 5	16.21	17.38	18.54	20.11	21.28	22.46	24. 3	25.21	26.39	27.58	29.17	29.56	37
38	1.16	2.32	3.48	5. 5	6.21	7.37	8.54	10.11	11.27	12.44	14. 1	15.18	16.35	17.55	19.10	20.28	21.46	23. 5	24.24	25.43	27. 3	28.23	29.43	30.23	38
39	1.17	2.34	3.51	5. 8	6.26	7.43	9. 1	10.19	11.37	12.54	14.12	15.31	16.49	18. 8	19.27	20.46	22. 6	23.26	24.46	26. 6	27.27	28.49	30.11	30.51	39
40	1.18	2.36	3.55	5.13	6.32	7.50	9. 9	10.28	11.47	13. 6	14.25	15.45	17. 5	18.24	19.44	21. 5	22.26	23.47	25. 9	26.31	27.53	29.16	30.40	31.22	40
41	1.19	2.39	3.58	5.18	6.38	7.57	9.17	10.37	11.57	13.18	14.39	16. 0	17.21	18.42	20. 4	21.26	22.48	24.10	25.33	26.56	28.21	29.46	31.11	31.53	41
42	1.21	2.41	4. 2	5.23	6.44	8. 5	9.26	10.47	12. 9	13.31	14.53	16.15	17.37	19. 0	20.23	21.46	23.10	24.34	25.58	27.24	28.50	30.16	31.43	32.26	42
43	1.22	2.44	4. 6	5.28	6.51	8.13	9.35	10.58	12.21	13.44	15. 7	16.31	17.55	19.19	20.43	22. 8	23.34	24.59	26.25	27.53	29.20	30.48	32.16	33. 0	43
44	1.23	2.47	4.10	5.34	6.58	8.21	9.45	11. 9	12.34	13.58	15.23	16.48	18.13	19.39	21. 5	22.32	23.59	25.26	26.54	28.23	29.53	31.22	32.51	33.37	44
45	1.25	2.50	4.15	5.40	7. 5	8.30	9.56	11.21	12.47	14.13	15.38	17. 6	18.33	20. 0	21.28	22.50	24.25	25.54	27.25	28.56	30.27	31.58	33.30	34.16	45
46	1.26	2.53	4.19	5.46	7.12	8.39	10. 6	11.34	13. 1	14.28	15.56	17.25	18.54	20.23	21.52	23.23	24.53	26.25	27.58	29.31	31. 3	32.37	34.12	5. 0	46
47	1.28	2.56	4.24	5.52	7.20	8.49	10.18	11.47	13.16	14.44	16.15	17.45	19.16	20.47	22.18	23.50	25.23	26.57	28.32	30. 7	31.42	33.18	34.56	35.46	47
48	1.29	2.59	4.29	5.59	7.29	8.59	10.30	12. 0	13.31	15. 2	16.34	18. 6	19.39	21.12	22.45	4.40	25.55	27.31	29. 7	30.45	32.23	34. 3	35.43	36.35	48
49	1.31	3. 3	4.34	6. 6	7.38	9.10	10.42	12.14	13.47	15.21	16.54	18.28	20. 3	21.38	23.14	24.51	26.28	28. 6	29.45	31.25	33. 6	34.48	36.33	37.26	49
50	1.33	3. 6	4.40	6.14	7.48	9.21	10.55	12.29	14. 5	15.40	17.16	18.52	20.29	22. 6	23.45	25.24	27. 3	28.43	30.25	32. 8	33.52	35.37	37.26	38.20	50
51	1.35	3.10	4.46	6.22	7.58	9.33	11. 9	12.46	14.24	16. 1	17.39	19.18	20.57	22.37	24.18	25.59	27.41	29.24	31. 8	32.54	34.41	36.30	38.23	39.19	51
52	1.37	3.15	4.52	6.30	8. 8	9.46	11.24	13. 3	14.43	16.23	18. 6	19.44	21.26	23. 8	24.52	26.36	28.21	30. 7	31.55	33.44	35.34	37.27	39.24	40.23	52
53	1.40	3.20	4.59	6.39	8.19	10. 0	11.40	13.21	15. 3	16.46	18.29	20.12	21.57	23.42	25.28	27.16	29. 4	30.53	32.45	34.38	36.33	38.29	40.29	41.29	53
54	1.42	3.24	5. 5	6.49	8.31	10.15	11.57	13.41	15.26	17.11	18.57	20.43	22.30	24.18	26. 7	27.58	29.50	31.42	33.38	35.35	37.32	39.26	41.40	42.46	54
55	1.45	3.29	5.14	6.59	8.44	10.30	12.15	14. 2	15.49	17.37	19.26	21.14	23. 5	24.56	26.49	28.43	30.39	32.35	34.35	36.36	38.39	40.47	42.56	44. 0	55
56	1.47	3.34	5.22	7.10	8.57	10.47	12.35	14.24	16.14	18. 5	19.56	21.49	23.43	25.37	27.34	29.32	31.31	33.33	35.36	37.42	39.51	42. 4	44.19	45.27	56
57	1.50	3.40	5.31	7.22	9.11	11. 4	12.56	14.48	16.45	18.33	20.29	22.25	24.23	26.21	28.22	30.24	32.27	34.34	36.46	38.53	41. 9	43.27	45.50	47. 2	57
58	1.53	3.46	5.40	7.34	9.26	11.22	13.18	15.14	17.10	19. 7	21. 4	23. 4	25. 0	27. 9	29.14	31.21	33.28	35.40	37.54	40.12	42.34	44.59	47.30	48.46	58
59	1.56	3.53	5.50	7.47	9.43	11.42	13.41	15.41	17.41	19.41	21.43	23.47	25.54	28. 1	30.12	32.22	34.12	36.53	39.13	41.37	44. 5	46.40	49.21	50.51	59
60	2. 0	4. 0	6. 0	8. 1	10. 2	12. 4	14. 6	16.10	18.14	20.18	22.26	24.34	26.46	28.55	31. 9	33.27	35.47	38. 9	40.36	43.10	45.48	48.31	51.24	52.51	60
61	2. 3	4. 8	6.12	8.17	10.21	12.27	14.34	16.40	18.49	20.57	23.10	25.23	27.39	29.56	32.16	34.35	37. 5	39.36	42.11	44.52	47.40	50.35	53.42	55.17	61
62	2. 7	4.15	6.24	8.32	10.41	12.52	15. 2	17.14	19.28	21.42	23.59	26.17	28.37	31. 1	33.27	35.57	38.31	41.10	43.54	46.46	49.46	52.56	56.20	58. 4	62
63	2.12	4.24	6.37	8.50	11. 4	13.19	15.34	17.51	20. 9	22.27	24.51	27.15	29.42	32.12	34.45	37.23	40. 5	42.54	45.49	48.53	52. 7	55.36	59.24	61.22	63
64	2.17	4.33	6.51	9. 9	11.28	13.47	16. 8	18.30	20.54	23.18	25.48	28.19	30.52	33.30	36.11	38.57	41.49	44.49	47.57	51.17	54.50	58.43	63. 2	65.22	64
65	2.22	4.44	7. 6	9.30	11.54	14.19	16.45	19.13	21.43	24.13	26.50	29.28	32. 9	34.55	37.46	40.42	43.46	46.59	50.43	54. 2	57.59	62.26	67.36	70.33	65
66	2.27	4.55	7.23	9.52	12.21	14.53	17.26	20. 0	22.37	25.14	27.58	30.44	33.34	36.29	39.31	42.40	45.58	49.26	53.11	57.14	61.47	67. 4	73.52	78.25	66

Of the Variation of the Compaſs.

The True Amplitude of the Sun, Moon, or a Star, is the Number of Degrees they riſe or ſet to the Northward or Southward of the Eaſt or Weſt Points of the Horizon ; and is always of the ſame Name with the Declination ; that is, if the Declination be North, the Amplitude is North ; but if the Declination be South, the Amplitude is South of the Eaſt or Weſt Points of the Horizon at their Riſing and Setting.

To find the true Amplitude by the Table of Amplitudes.

Look for the given Latitude in the Right Hand Column of the Table, and the Declination at the Top ; the common Angle of meeting will be the Degrees and Minutes of the Amplitude required.

EXAMPLE I.

In Latitude 40°N. when the Declination was 17° N. required the Sun's true Amplitude at Riſing ?

Oppoſite Latitude 40°, and under the Declination 17°, ſtand 22° 26′. the true Amplitude, and is to be counted from the Eaſt towards the North, becauſe it is at the Sun's Riſing, and the Declination is North ; that is, E. 22° 26′N.

But when the Latitude is given in Degrees, and the Declination in Degrees and Minutes, find the Latitude before, and the neareſt Degrees to the given Declin. at the Top, againſt which, and under the given Latitude ſtands the true Amplitude ; or, if the Minutes of the Declination be near 30, or half a Degree, find the Amplitude for the given Degrees of Declination, and the Amplitnde for one Degree above it , add theſe two Amplitudes together, half their Sum will be the true Amplitude, ſufficiently exact for Practice at Sea.

EXAMPLE II.

Suppoſe I would know the Sun's true Amplitude at his Setting in Latitude 57°, his Declination being 11° 33′S.

Find the Ampl. as before for the Lat. 57°, and the Declinations $\left\{\begin{matrix}11^\circ\\12\end{matrix}\right\}$ which will be $\left\{\begin{matrix}20^\circ & 29'\\22 & 25\end{matrix}\right.$

their Sum 42 54

Half the Sum 21 27 is the true Amplitude, that is, W. 21° 27′ S. becauſe at Sun Setting, and the Declination South. In like Manner, if the Declination be in Degrees, and the Latitude in Degrees and Minutes, as in

EXAMPLE

EXAMPLE III.

Suppoſe it were required to find the Sun's true Amplitude at Setting in Latitude 49° 27′, when his Declination was 21° N?

Now 27 Minutes being nearly Half a Degree, therefore,

For Lat. 49°	and Declination 21°	33° 6′
For Lat. 50	the Amplitudes are	33 52
	Sum	66 58

Half the Sum is 33 29, the true Amplitude required; that is, W. 33° 29′ N. becauſe the Sun was Setting, and the Declination N.

When the Latitude and Declination are both given in Degrees and Minutes, take the neareſt Degrees to both, unleſs they are near 30 Minutes, as obſerved before, and find the Amplitude as in Example I.

EXAMPLE IV.

Suppoſe it were required to find the Sun's true Amplitude at Setting, In Latitude 49° 18′, his Declination being 19° 41′ N.

Now as the Latitude is neareſt to 49°, and the Declination neareſt 20°, therefore under Latitude 49° and againſt Declination 20, ſtands 31° 25′N. the true Amplitude; that is, W. 31° 25′N. the Declination being North, and at the Sun's Setting.

In like Manner may the Amplitude be found with ſufficient Accuracy; and, therefore, think it ſuperfluous to trouble the Mariner with a Table of Numbers, &c. ſince the Amplitude cannot be obſerved nearer than to Degrees at Sea; however, as this Book may come into the Hands of thoſe acquainted with Trigonometry, we ſhall treat of this and an Azimuth, after we have gone through the Journal.

To find the Variation of the Compaſs.

Having found the true Amplitude, by the Table as before taught, it remains now to find the Variation of the Compaſs; to do which, we muſt have the True and Magnetic Amplitude given.

The Variation of the Compaſs is the Number of Degrees the Needle's Points ſtands from the true North or South Points of the Horizon, reckoned to the Eaſtward or Weſtward.

The Sun's Magnetic Amplitude is the Number of Degrees; his Centre is Northward or Southward of the Eaſt or Weſt Point of the Compaſs at the Riſing or Setting, and is found the an Azimuth Compaſs in the following Manner:

Move the Box about till the four Cardinal Points of the Card coincide with the four Lines in the Sides of the Compaſs-Box: keep the Box ſteady, and turn the Index till the Centre of the Sun at Riſing or Setting, when his lower Edge juſt touches the Horizon is ſeen through both the Sights; then the Degrees between the North Point of the Compaſs, and the End of the Index pointing to the Sun, will be the Magnetic Amplitude ſought.

Having thus found the True and Magnetic Amplitude, it is plain, that if they agree there is no Variation; but if they differ, which they generally do, the Difference is the Variation.

When the Amplitudes are both North, or both South, ſubtract the Leſs from the Greater, and the Difference is the Variation.

But if one be North, and the other South, their Sum is the Variation: And to know which Way it is, obſerve this general

Rule. Let the Obſerver's Face be turned to the Sun; then, if the True Amplitude be to the Right Hand of the Magnetic, or obſerved Amplitude, the Variation is Eaſterly; but if it be to the Left Hand, Weſterly.

EXAMPLE I.

Suppoſe the Sun's true Amplitude at Riſing is E. 14° 29′ N. but by Compaſs it is found to be E. 26° 12′N. what is the Variation?

From the greater E. 26° 12′N.
Take the leſſer E. 14 29 N.

Remains the Variation 11 43 E.

And is Eaſt, becauſe the true Amplitude is to the Right of the Obſerved.

EXAMPLE III.

Suppoſe the Sun's true Amplitude at Riſing is E. 13° 30′ N. and his Magnetic Amplitude E. 12° 30′ S. required the Variation, and which Way.

Since the true Amplitude and Obſerved have different Names.

To the true Amplitude E. 13° 30′N.
Add the Obſ. Amp. E. 12 30 S.

Sum is the Variation 23 00W.

Which is Weſterly, becauſe the true Amplitude is to the Left of the Obſerved.

EXAMPLE II.

Suppoſe the Sun's true Amplitude at Setting, W. 34° 30′S. and Magnetic Amplitude W. 23° S. required the Variation.

From the Greater W. 34° 30′ S.
Take the Leſs W. 23 00 S.

Remains the Variation 11 30W.

Which is Weſterly, becauſe the true Amplitude is to the Left of the Obſerved.

EXAMPLE IV.

Suppoſe the Sun's true Amplitude is E. 1° 50′, and Magnetic Amplitude E. 32° 28′ required the Variation, and which Way?

To the obſerved Amp. E. 32°28′N.
Add. the true Amp. E. 1 50N.

Sum is the Variation 34 18 E.

Which is Eaſterly, becauſe the true Azimuth is to the Right of the Obſerved.

Of the LOG and HALF-MINUTE GLASS.

THE Log, and Log-Line, by which we meaſure the Ship's Way at Sea, are too well known to every Mariner to be here deſcribed; let it ſuffice to give a few Remarks upon the Manner of dividing the Log-Line and trying the Half Minute Glaſs.

The Diviſions, or Knots, in the Log-line, are founded upon this, that each Knot ſhould bear the ſame Proportion to a Sea Mile that Half a Minute does to an Hour.

Now a Sea Mile is found to contain about 6120 Feet; this divided by 120, (the Half Minutes in an Hour) gives 51 Feet for the Diſtance between the Knots; but on Account of the Way the Log is found to make after the Ship, one Foot is thrown off, and 50 Feet is taken for the Knot, to anſwer to a Glaſs that runs 30 Seconds; this 50 Feet, being divided by 10, gives 5 Feet to every Fathom, ſo that in caſting up the Log in the Column of Fathoms, each Fathom anſwers to 1, or 1 Tenth of a Knot, and 10 Fathoms make a Knot; which is certainly the beſt adapted for Practice, ſince all the Tables and Inſtruments uſed in Navigation are decimally divided. But ſome experienced Commanders find, that the allowing 50 Feet to a Knot, generally makes the Ship a-head of the Reckoning; and to avoid Danger, moſtly divide the Log line into Knots of 7 or 7½ Fathoms, of 6 Feet each, to correſpond with a Glaſs that runs 28 Seconds. Others again, divide the Seconds the Glaſs runs by 4, and take the Quotient for the Diſtance in Fathoms between the Knots: Which of theſe Methods are beſt, I leave to every Captain's own Experience to determine; but certain it is, that whatever Lengths the Knots are, the moſt convenient Way is to divide them into Tenths.

In hot or dry Weather, the Glaſs runs out faſter than in moiſt or rainy Weather; therefore Care ſhould be taken to try what Number of Seconds the Glaſs runs, which is eaſily done by the following Rule:

Take a Muſket Ball, or ſome ſuch round Subſtance, and faſten a Piece of Pack thread or Silk to it, and hang it by a Loop upon a Peg or Nail, ſo that the Diſtance between the Centre of the Ball and the Nail be 39,2 Inches, then give it a gentle Swing, turning your Glaſs at the ſame Time, and count the Number of Swings it makes while the Glaſs is running, and they will be the Seconds required.

Care ſhould alſo be taken to meaſure the Log-line pretty often, leſt it ſhould ſtretch and deceive you in the Diſtance.

The

The Method of Keeping a Journal at Sea.

BY keeping a Journal, is meant keeping ſuch an Account of the Ship's Way that the Mariner may be able at any Time to aſcertain the Latitude and Longitude the Ship is in; it therefore ſhould be the great Concern of every Perſon who takes upon him the navigating of Ships to remote Parts, to be expert therein, as the Lives and Fortunes of ſo many Men are committed to his Charge.

When a Ship is bound from one Place to another, which lies ſo far from her, that ſhe is obliged to go out of Sight of Land for any conſiderable Time, as from England to Jamaica; at the Time of her leaving Sight of Land, ſhe is ſaid to take her Departure, and that Part of the Land ſhe then leaves, is ſaid to be the Place ſhe takes her Departure from; ſuch as the Land's End, Lizard, &c. and at the Time of taking ſuch Departure, the Captain or Mate generally takes the Bearing and Diſtance of that Land (according to his Judgment) and ſets it down on the Log-board, or in the Log-book againſt the Time it was taken, thus, Land's End N. N. E. Diſt. 7 Leagues, or Lizard N. by W. Diſt. 5 Leagues, &c.

In the ſame Manner may the Departure from any Place be taken, as may be ſeen in the firſt Day's Log. of the following Journal, where the Log-book is marked in Columns for Hours, Knots, Fathoms, Courſes, Winds, Leeway, Tranſactions; and under it the Columns for Courſes, Diſtances, Northings, or Southings, Eaſtings or Weſtings, the Latitude by Dead Reckoning, Latitude by Obſervation, Meridian Diſtance, Difference of Longitude, Longitude in, and in the laſt, the Bearing and Diſtance of the Land.

Notice muſt be taken, that in the Column for Courſe, you are always to ſet down the Courſe you have made by your Reckoning for that 24 Hours; that is, from the Noon of the Day before to the Noon of the Day you work on, the Sea Account being always kept from Noon to Noon.

In the Columns for Diſtance you are to ſet down the Diſtance made by your Reckoning for that 24 Hours.

In the Columns of Northing and Southing, you are to ſet down the Difference of Latitude made in that 24 H. marking the Column with North, if the Difference of Latitude be North; and South, if South.

In the Column of Eaſting or Weſting, you are to ſet down the Departure made that 24 Hours, marking the Column with Eaſt, if the Departure be Eaſt, and with Weſt, if Weſterly.

In the Column marked Latitude by D. R. you are to ſet down the Latitude you reckon yourſelf in on that Day; and in the Column marked

marked Lat. by Ob. you are to ſet down the Latitude found by Obſervation. In the Column of Meridional Diſtance, you are to ſet down (in Degrees and Minutes) the whole Departure you have made from the Place you took your Departure from; alſo the Difference of Longitude made in the 24 Hours in the Column marked Diff. Long. the Longitude in, in the Column marked Long. in; and in the laſt, the Bearing and Diſtance from the Land.

The Variation, if any, muſt be allowed upon all Courſes ſteered, and upon all Bearings that are taken by the Compaſs; that is, if it be Eaſterly Variation, it muſt be allowed to the Right Hand, if Weſterly to the Left of the Courſe or Bearing. Suppoſing yourſelf placed in the Centre of the Compaſs, and looking directly forward to the Point, you are to allow the Variation upon.

EXAMPLE.

Suppoſe I ſteer S. W. and there is one Point Weſterly Variation, then my true Courſe is S. W. by S. or ſuppoſe I ſet a Point of Land, and find it to bear by the Compaſs E. S. E. and I know there is Half a Point Eaſterly Variation, then the true Bearing is S. E. by E. ½ E.

Leeway muſt be allowed upon all Courſes ſteered, which is the Difference between the Point which the Ship endeavours to ſail upon, and the Point ſhe really ſails upon, and is cauſed by the Force of the Wind or Surge of the Sea, when ſhe is cloſe hauled or plying to Windward, which makes her fall off and glide ſideways from the Point of the Compaſs ſhe capes at, and muſt be allowed to be on the Right Hand of the Courſe ſteered when the Larboard Tacks are on Board, and to the Left Hand when the Starboard Tacks are on Board. The Allowances that are generally made are as follow:

1ſt. When a Ship is cloſe hauled, if all her Sails be ſet, the Water ſmooth, and a moderate Gale of Wind, ſhe is then ſuppoſed to make little or no Leeway.

2dly. The Ship being upon a Wind, and the ſmall Sails in, allow one Point for Leeway.

3dly. The Wind blowing hard, ſo as to cauſe one Top-ſail to be taken in, allow two Points for Leeway.

4thly. When it blows ſo hard that both Top-ſails are taken in, and the Sea runs high, allow then three Points for Leeway.

5thly. The Fore-ſail being furled, and the Ship tries under a Main-ſail and Mizen, allow four Points for Leeway; for ſhe then makes her Way about four Points before the Beam, as the Sea Phraſe is.

6thly. When the Ship tries under the Main-ſail only, ſhe then makes her Way about three Points before the Beam, that is, near five Points for Leeway.

7thly. If the Ship tries under the Mizen only, her Way is about two Points before the Beam; that is, allow ſix Points for her Leeway.

8thly. When ſhe lies a Hull, that is, with all her Sails furled, her Way is one Point before the Beam, and then ſeven Points is her Leeway.

9thly. When a Ship is lying-to under a Main-ſail, Mizen, &c. then obſerve how ſhe comes up and falls off, and take the Middle between the two Points, and from that allow the Leeway and Variation.

NOTE. In all Caſes, Reſpect muſt be had to the Smoothneſs of the Water, or the Sea's running high; the Mould and Trim of the Ship, and then the Allowances may be aſcertained with the greater Certainty, by ſetting the Ship's Wake by a Compaſs placed on each Rail of the Ship's Quarter, which is uſually ſet there for that Purpoſe.

EXAMPLE I.

Suppoſe I ſteer N. E. by E with my larboard Tacks on board, and make one Point Leeway, then my Courſe made good is E. N. E.

Leeway and Variation, when they are both to be allowed one Way, that is, both to the Right Hand, or both to the Left, add them together, and allow their Sum the ſame Way they were to be allowed.

But if they are to be allowed, one to the Right Hand, and the other to the Left, ſubtract the leſs from the greater, and allow the Remainder the ſame Way the greater was to be allowed.

EXAMPLE II.

Suppoſe I ſteer N. N. W. with my ſtarboard Tacks on board, and make one Point Leeway, there being at the Time Half a Point Weſterly Variation; I would know my true Courſe?

Leeway to the left Hand	1 Point.
Variation to ditto	½ Point.
Their Sum to be allowed to the left Hand	1 ½ whence

The true Courſe is N. W by N. ½ W.

EXAMPLE

EXAMPLE III.

Suppoſe I ſteer S. W. by W. with my larboard Tacks on board, and make two Points and an half Leeway, and I have one Point and a quarter Weſterly Variation, what is my true Courſe?

Leeway to the right Hand	2½ Points.
Variation to the left Hand	1¼ Point.
The Remain. to be allowed to the right Hand	1¼ whence

The true Courſe is W. S. W. ¼ Weſterly.

EXAMPLE IV.

Suppoſe a Ship lying-to under a Main ſail, with her ſtarboard Tacks on board, comes up E. by S. and falls off to N. E. by E. there being one Point Weſterly Variation, and ſhe makes 5 Points Leeway, what Courſe does ſhe make good?

The Middle between E. by S. and N. E. by E. is E. by N. for which allowing 6 Points to the left Hand, the true Courſe will be N. by E.

Currents, the Way they ſet you, and the Diſtance you ſuppoſe you are driven by them, is to be ſet in the Traverſe Table for the Day, as any other Courſe and Diſtance.

EXAMPLE V.

Suppoſe I try the Current, and find it to ſet W. by N. per Compaſs one Mile per Hour, the Variation being one Point Eaſterly; then if I ſail in that Current 24 Hours, I ſet down in the Traverſe Table as a Courſe, W. N. W. Diſtance 24 Miles.

Heave of the Sea is to be accounted for in the ſame Manner as Currents: As, ſuppoſe there is a great Sea heaving towards the S. W. by my Compaſs, there being Half a Point Weſterly Variation, I then ſet down in my Traverſe Table S. W. by S. half Weſterly, with ſo much Diſtance as I judge the Sea has heaved the Ship.

At leaving the Land, the oppoſite Point to the Bearing, with the Variation allowed upon it, and the Diſtance you judge yourſelf from it, muſt be ſet down in the Traverſe Table as a Courſe and Diſtance.

EXAMPLE VI.

Suppoſe having one and a quarter Point Weſterly Variation, the Start bearing by my Compaſs N. N. E. diſtant four Leagues; the oppoſite Point to N. N. E. is S. S. W. which, with the Variation, makes S. ¾ Weſterly, for the Courſe to be ſet in the Traverſe Table diſtant 12 Miles.

When you make the Land your Bearing, itſelf (with the Variation allowed upon it) and the Diſtance you judge yourſelf from it, is to be ſet down in the Traverſe Table as a Courſe and Diſtance. This needs no Example.

The Courſes marked on the Log-board are the Courſes ſteered by the Compaſs. In order to obtain the true Courſe, it is neceſſary to allow both for the Variation of the Compaſs, and for the Leeway upon each Courſe on the Log-board, as has been ſhewn, before they are put into the Traverſe Table.

Every Day, at Noon, the Log-board is to be tranſcribed into the Log-book, which is ruled exactly like the Log-board.

Mariners reckon by the civil Account of Time uſed on Shore, but they keep the Reckoning for the Ship's Place, by beginning at Noon, and counting from thence 24 Hours to the next Noon. From Noon to Midnight they mark with P. M. ſignifying after Mid-day; and the ſecond 12 Hours with A. M. ſignifying after Midnight, ending their Day's Work at the Noon of the civil Day. Hence their Ship's Account is 12 Hours earlier than their Shore Account of Time. And as the Sun's Declination uſed for finally determining the Ship's Place at the End of the Sea Day is calculated for the Noon of the common Day at London, therefore the Declination fort he Noon of the civil Day, muſt be taken for determining the Latitude, &c. at finiſhing their Day's Account.

There are various Methods of keeping a Sea Journal, according to the Sentiments of various Perſons with Regard to what deſerves being recorded: Some approve of a Journal including the Log-book, each Day's Work at ſome Length, and ſuch Occurrences as ſeem of moſt Importance; while others prefer a ſhort Abſtract of this long Journal, containing little more than the Courſe run, the Latitude and Longitude in, and ſometimes the Bearing and Diſtance of the intended Port, or any other remarkable Cape, Rock, Iſland, &c. for each Day.

In the following Journal the long Form is uſed as repreſenting more fully each Day's Work, and the neceſſary Corrections; and an Abſtract of this may be drawn out in the ſhorteſt Form that ſeems conſiſtent with Diſtinctneſs. The Learner ought to be thoroughly acquainted with the long Form, and when he does that, he may either continue it, or take the ſhorteſt Form; or retrenching from the firſt, and adding to the ſecond, what Particulars he thinks proper, he may thereby make out a Form adapted to his own particular Taſte.

Rules

RULES for correcting the DEAD RECKONING by an Obſervation.

NOTWITHSTANDING the Rules already laid down for keeping a Ship's Way at Sea, yet by Reaſon of the ſeveral Accidents that may attend a Ship in one Day's Run, ſuch as ſwelling Seas, different Rates of ſailing between the Times of heaving the Log, want of Care at the Helm in letting the Ship yaw or fall aft, accidental Currents, ſudden Squalls, when no Account can be kept &c. the Latitude by Account and Latitude by Obſervation may very often differ, then it is neceſſary that proper Corrections be made in the Difference of Longitude.

When you have made all proper Allowances you can, ſuch as for Leeway, Variation, Currents, &c. and ſtill find that your Latitude by Account will not agree with your Latitude by Obſervation, then you muſt correct as follows:

Firſt, Conſider whether you have made proper Allowances for Currents, Heave of the Sea, if the Courſe at the Helm has been carefully attended to, if the Log-line and Half-minute Glaſs be juſt, and the Log properly hove, or any ſudden Squalls, or proper Allowances made for the Leeway, &c. which of theſe you conjecture your Error is in; make what Allowances you think meet to your Difference of Latitude and Departure by Dead Reckoning, and ſee if that will reform your Latitude by Account, ſo as to make it agree with your Latitude by Obſervation; if it does, you have gueſſed right; (for you muſt always keep to the Latitude by Obſervation, it being the only Thing to be depended on;) but if it will not agree with the obſerved Latitude, it is to be ſuppoſed that there are Miſtakes in your Conjecture, or ſome other Cauſe which produces the Error in the Reckoning, and ſtands in need of being corrected.

EXAMPLE

Yeſterday at Noon, we were in Lat. 36° 15′N. and have ſailed theſe 24 Hours S. E. ½ E. 55 Miles, N. E. by N. 20 Miles, W. S. W. 70 Miles, S. by W. ½ W. 20 Miles, and by Obſervation this Day at Noon we are in Lat. 34° 56′N.

The TRAVERSE TABLE.

Courſes.	Diſt.	N.	S.	E.	W.
S. E. ½ E.	55		34.9	42.5	
N. E. by N.	20	16. 6		11,1	
W. S. W.	70		26.8		64.7
S. by W. ½ W.	20		19.1		5.8
		16. 6	80,8	53.6	70.5
			16.6		53.6
			64. 2		16.9

By the Traverſe Table it appears that by Account the Diff. of Lat. is 64.2 S. and the Departure 16.9 W.

Latitude ſailed from	36°	15′N.
Difference of Latitude by Account	1	4 S.
Latitude in by Account	35	11 N.

Differing 15 Miles from the Latitude by Obſervation.

I firſt examine the Log-line and Half-minute Glaſs, and find them both right. Next I conſider whether there be any Current, and I think I have Reaſon to ſuſpect one: Upon Trial I find there is one ſetting S. S. W. ¾ W. at the Rate of 7 Fathoms an Hour, and judge I have been in it theſe 24 Hours. Then 7 Fathoms (or Tenths of a Knot) per Hour, in 24 Hours, makes about 17 Miles; and to the Diſt. 17 Miles, and Courſe S. S. W. ¾ W. the Diff. of Lat is 14.6 S. and Departure 8.7 W.

	Diff. Lat.	Dep.			
Now by Tra. Table	64.2S.	16.9W.	Latitude ſailed from	36°	15′N.
And by Current	14 6S.	8.7W.	Diff. of Lat. cor. for Cur.	1	19 S.
Correct for Cur.	78.8S.	25 6	Lat. in correct. for Cur.	34	56

Which agreeing with my Latitude by Obſervation, I conclude that my Reckoning is right; then having the Latitude left, and Latitude come to, the Difference of Longitude may be found either by Middle Latitude or Mercator's Sailing as before.

If after all proper Allowances are made for Errors in Diſtance, Currents, &c. the Latitude by Account and obſerved Latitude ſhould diſagree,

diſagree, then the Reckoning muſt yet be further corrected; to do which, the following are the common, and ſeem to be the moſt rational Methods.

CASE I.

If the Courſe found by Dead Reckoning be leſs than 3 Points or 33 Degrees.

Rule. To the Difference of Latitude and Departure by Account find a Courſe; to this Courſe and the Difference of Latitude by Obſervation, find the Difference of Longitude, either by Middle Latitude or Mercator's Sailing.

EXAMPLE.

Yeſterday, at Noon, we were in Lat. 39° 18′N. by an Obſervation, this Noon we are in Lat. 37° 48′N. and our Dead Reckoning gives 107 Miles of Southing, and 64 of Weſting; required the true Difference of Longitude?

To the Difference of Latitude 107, and Departure 64, I find the Courſe 2 ¾ Points; then with Meridional Difference of Latitude between the two Obſervations 115, and the ſame Courſe, I find the true Difference of Longitude 69 Miles.

CASE II.

If the Courſe found by Dead Reckoning be more than 3 Points, or 33°, and leſs than 5 Points, or 56°.

Rule. With the Diff. of Lat. and Dep. by Account, find the Diſtance; with this Diſtance, and the Diff. of Lat. by Obſervation, find another Departure. Take half the Sum of this Dep. and Dep. by Account, for the true Dep. with which and the Diff. of Lat. by Obſervation, find the Diff. of Long.

EXAMPLE.

Yeſterday, at Noon, we were in Lat. 52° 40′N. and are this Noon in Lat. 54° 22′N. having by Account made 84 Miles of Northing and 76 Miles of Weſting; required the true Difference of Longitude?

To the Diff. of Lat. 84, and Dep. 76, the Diſtance is 113 Miles, and the Courſe 42°

To Diſt. 113, and Diff. of Lat. between the two Obſervations 102, the Dep. is 47.7; then 76 added to 47.7, is 123.7, half of which is 61.8, the true Dep.

To Dep 61.8, and Diff. of Lat. by Obſervation 102, the Courſe is 31°, and with the Courſe 31°, and the Meridional Diff. of Lat. between

between the two Obſervations 171, I find the Diff. of Long. is 103 Miles.

CASE III.

If the Courſe by Dead Reckoning be more than 5 Points, or 56°.

Rule. With the Diff. of Lat. and Departure by Account find the Diſtance; then with this Diſt. and Diff. of Lat. by Obſervation find the Diff. of Long.

EXAMPLE.

Yeſterday at Noon we were in Lat. 38° 52′ N. to-day at Noon we are in Lat. 40° 18′ N. and by Account have made 68 Miles of Northing, and 112 Miles of Weſting; required the true Difference of Longitude?

With the Diff. of Lat. 68, and Depar. 112, I find the Diſt. 132 Miles, and to Diſtance 132, and Diff. of Lat. by Obſervation 86, the Courſe 49° 30′ nearly; with this Courſe, and the Meridional Diff. of Lat. between the two Obſervations 111, the Diff. of Long. is 130 Miles.

Note. As the true Place of a Ship depends upon her Lat. and Long. being truly aſcertained, I have ſet theſe down only, the reſt being of leſs Conſequence to the Mariner.

To correct for ſeveral Days.

By Help of the three preceding Rules, the Long. may always be corrected for a ſingle Day, but if an Obſervation has been wanted for one or more Days, then mark the Lat. and Long. at laſt Obſervation, or if this be your firſt Obſervation ſince leaving the Land, mark the Lat. and Long. of the Land you left; this is the only Lat. and Long. you can call certain; all the following Part of the Reckoning muſt undergo a Correction, which is made as follows:

Take the Northings, Southings, Eaſtings, and Weſtings, that you have made ſince your laſt Obſervation; or if it be your firſt Obſervation, then for every Day from your leaving the Land, minding not to leave out the Diff. of Lat. and Dep. of the Day you correct on, and bring them into a Traverſe Table, by which you will have the whole Diff. of Lat. and Dep. by Account ſince the laſt Obſervation; and with that ſame Diff. of Lat. and Dep. find the Courſe by dead Reckoning; then obſerve which of the foregoing Caſes that Courſe falls under, and correct by the Rule for that Caſe. But when an Obſervation has been wanting for ſeveral Days, then mark the Latitude and Longitude you were in at your laſt Obſervation, or leaving the Land as before, and then you may correct with a greater Degree of Certainty; eſpecially in high Latitudes, by the following Rules,

CASE I.

Reckoning from the laſt certain Latitude and Longitude.

When the Courſe given by the Meridional Diff. of Lat. and Diff. of Long. by Account, taken as Diff. of Lat. and Dep. is leſs then 3 Points, or 33 Degrees.

Rule. To the Mer. Diff. of Lat. and Diff. of Long. by Account (taken as Diff. of Lat. and Dep. as ſhewn in the Mercator's Sailing) find a Courſe, with this Courſe and the Merid Diff. of Lat. by Obſervation, find a correſponding Dep. which will be the correct Diff. of Long.

EXAMPLE.

Having ſailed three Days ago from Lat. 49° 57′N. and got no Obſervation till this Day at Noon, and find I am in Lat. 45° 23′ N. and by Dead Reckoning I am in 45° 12′N. having differed my Long. 171 Miles, required my true Difference of Longitude?

			M. Parts.				M. Parts.
Lat. ſailed from	49	57 N.	3470	Lat. ſailed from	49	57	3470
Lat. by Account	45	12 N.	3047	Lat. by Obſer.	45	23	3063
Merid. Diff. of Lat. by Acc.			423	Mer. Diff. of Lat. by Obſ.			407

To Merid. Diff. of Lat. by Acc. 423, and Diff. of Long. by Acc. 171, the Courſe is 22°. Then with the Courſe 22°, and Meridional Diff. of Lat. between the Obſervations 407, I find the Diff. of Long. is 164 Miles.

CASE II.

When the Courſe given by the Meridional Diff. of Lat. and Diff. of Long. by Account (taken as before) is greater than 3 Points, and leſs than 5 Points.

Rule. To the Merid. Diff. of Lat. and Diff. of Long. by Account, taken as Diff. of Lat. and Dep. find a Diſtance; with this Diſtance, and Merid. Diff. of Lat. by Obſervation, find a correſponding Departure; Half the Sum of this Dep. and the Diff. of Long. by Account, is the correct Diff. of Longitude.

EXAMPLE.

Three Days ago we were in Lat. 45° 23′N. and have ſince that Time ſailed between South and Weſt, have by Dead Reckoning altered our Lat. 94 Miles, and our Long. 147 Miles: but by an Obſervation

ſervation this Day, we find we are in Lat. 43° 34′; required the correct Diſt. of Long.

		M. Parts.			M. Parts.
Lat. ſailed from	45° 23′N.	3063	Lat. ſailed from	45° 23′	3063
Lat. by Acc.	43 29 N.	2931	Lat. by Obſ.	43 34	2910
Mer. Diff. of Lat. by Acc.		132	Mer. Diff. by Obſer.		153

With the Merid. Diff. of Lat. by Acc. 132, and Diff. of Long. by Acc. 147, I find the Diſtance 198, and Courſe 48°. Then to Diſtance 198, and Merid. Diff. of Lat. by Obſervation 153, the Dep. is 125; now 125 added to 147 is 272, and half this Sum, *viz.* 136, is the correct Diff. of Long.

CASE III.

When the Courſe given by the Mer. Diff. of Lat. and Diff. of Long. by Acc. (taken as before) is more than 5 Points or 56 Degrees.

RULE. To the Merid. Diff. of Lat. and Diff. of Long. by Acc. taken as Diff. of Lat. and Dep. find a Diſtance.

To this Diſtance and Merid. Diff. of Lat. by Obſervation find a correſponding Dep. this Dep. will be the correct Diff. of Long.

EXAMPLE.

Two Days ago I was in Lat. 43° 34′N. and have ſince then made by Acc. 50 Miles of Southing, and 256 Miles Diff. of Long. Weſt, but find by Obſervation that I am in 42° 30′N. what is my true Diff. of Long.

		M. Parts.			M. Parts.
Lat. ſailed from	43° 34′N.	2910	Lat. ſailed from	43° 34′	2910
Lat. by Acc.	42 44 N.	2841	Lat. by Obſer.	42 30	2822
Mer. Diff. of Lat. by Acc.		69	Mer. Diff. of Lat. by Obſer.		87

Then to Merid. Diff. of Lat. by Acc. 69, and Diff. of Long. by Acc. 256 (taken as Diff. of Lat. and Dep.) the Diſtance is 265, and Courſe 73 Degrees.

And to Diſtance 265, and Diff. of Lat. 87 (the Merid. Diff. of Lat. by Obſervation) the Dep. is 250, which is the correct Diff. of Long.

Here we have given at ſome Length the different Methods of correcting the Dead Reckoning by an Obſervation, which are readily done by the Table of Diff. of Lat. and Dep.

A JOURNAL

A
JOURNAL of a VOYAGE
FROM
LONDON to St. MARY's,
One of the Western Islands;

In the Catherine, of London, J. HEBDEN, Commander, kept by T. WHITE, Mate.

Departure taken from the Lizard in Lat. 49° 57′N. Long. 5° 14′W.
Bound for St. Mary's, in Lat. 37 N. Long. 37 6 W.

In order to ſhorten the following Work, it may be proper to obſerve here, that + ſignifies Addition; — Subtraction; × Multiplication; ÷ Diviſion; = equal to; : :: : Proportion, or the Rule of Three, thus, 2 : 4 :: 3 : 6; that is, as 2 is to 4, ſo is 3 to 6.

Note. The following Journals exhibit moſt of the common Occurrences that happen at Sea, and is worked intirely by Inſpection from the Tables, and will be found ſufficiently exact for keeping a Ship's Way to any Part, without the Trouble of a rigid Calculation by Logarithms.

H.	K.	F.	Courſes.	Winds.	Leeway.	Remarks on Board, Sunday, May 4th, 1784.
2						Theſe 24 Hours moderate Gales, and fair Weather.
4						
6						
8	4		S. W. by W.	N. E.		At 6 P. M. the Lizard bore N. by E. Diſtance 6 Leagues, from which I take my Depar. it being in the Lat. of 49° 57′ N. and Long. 5° 14′ Weſt of London.
10	4	5				
12	5					
2	5					
4	5	5	S. W.			Unbent the Cables and ſtowed the Anchor.
6	5	5				Several Sail in Sight, ſtanding to Weſtward.
8	5	5				
10	5	5				
12	6					Variation 1 ½ Point Weſterly.

Courſe.	Diſt.	S.	W	Lat. by D. R.	Lat. by Ob.	Mer. Diſt.	Diff. Lon.	Long. in.	Bearing and Diſt.
S. 27° W	107	96	48	48. 21 N.		0° 48′	73	6° 27′W.	St. Mary S 50 W. 1060 M.

The Lizard bearing N. by E. Diſt. 6 Leagues from the Ship, is the ſame as if the Ship had ſailed from the Lizard 6 Leagues or 18 Miles upon the oppoſite, or S. by W. Point of the Compaſs, and allowing for the Variation, as before taught, makes it S. half E. Diſt. 18 M. which is to be ſet down as the firſt Courſe and Diſtance in the following Traverſe Table.

The firſt Courſe ſteered by Compaſs is S. W. by W. which, allowing for the Variation, makes S. W. by S. half W. and the Sum of all the Diſtances ſailed on that Courſe till two o'Clock, when it alters, is 18 Miles and an half, which being doubled, becauſe the Log. is heaved every two Hours, gives 37 Miles; ſo the ſecond Courſe and Diſt. to be ſet down in the Traverſe Table is S. W. by S. half W. 37 Miles. In like Manner the ſecond Courſe ſteered is S. W. and the Variation allowed makes it S. S. W. half W. and the Diſt. on that Courſe ſummed up and doubled, gives 56 Miles; therefore the third Courſe and Diſtance to be ſet down in the Traverſe Table is S. S. W. half W. 56 Miles. Having found the whole Difference of Latitude and Departure made upon the ſeveral Courſes, I then mark down upon my Slate or Paper what every Thing that is to be found comes to, and afterwards ſet them down in their proper Columns as above.

TRAVERSE TABLE.

Courſes.	Diſt	N.	S.	E.	W.
S. ½ E.	18		17. 9	1. 8	
S. W. by S. ½ W	37		28. 6		23. 5
S. S. W. ½ W.	56		49. 4		26. 4
			95. 9		49. 9
					1. 8
					48. 1

Now to Diff. of Lat. 95. 9 S. and Dep. 48, 1 W. the Courſe is S. 27° W. Diſt. 107 Miles, then Lat. ſailed from, or Lizard's Lat. 49° 57′ N.

then Lat. ſailed from, or Lizard's Lat.	49° 57′ N.
Diff. of Lat. ———	1 36 S.
Lat. in, or Ship's Lat.	48 21 N.
Sum of Lats. ———	98 18
Middle Lat. ———	49 09
Com. of Middle Lat.	40 51

Then with this Com. of Mid. Lat. 40° 51′, or 41° found as a Courſe among the Degrees, and the Dep. 48.1 in its Column, in the Diſt. Col. ſtands 73, which is the Diff. of Long.

Longitude ſailed from, or Lizard's Longitude	5° 14′W.
Difference of Longitude 73 Miles ——	1 13 W.
Longitude in, or Ship's Longitude ——	6 27 W.

Now to find the Courſe and Diſtance to the intended Port;

		Mer. Parts.		
Ship's Lat.	48° 21′ N.	3323	Ship's Long.	6° 27′W.
St. Mary's Lat.	37 00 N.	2393	St. Mary's Long.	25 6 W.
Diff. Lat. 681 Miles = 11 21		Mer. Diff. Lat. 930	Diff. of Long. 1119 Miles =	18 39 W.

So from the Ship to St. Mary's the Courſe is found by Caſe I. in Mercator's Sailing, to be S. 50 W. Diſtance 1060 Miles.

H.	K.	F.	Courſes.	Winds.	Lee-way.	Remarks on Board, Monday, May 5th, 1784.
2	6		S. W. by W.	N.		Theſe 24 Hours moderate Gales and cloudy Weather.
4	5	5				
6	5			N. W.		At 4 P. M. Spoke with the Charming Nancy, from Carolina, bound to London.
8	5					
10	3	6	S. W.			
12	3	4				
2	3	4				
4	4	5				
6	4	6				P. M. got the beſt and ſmall Bower Anchors on the Gunnel, and unbent the Cables and ſtowed them.
8	5		S. W. by S.	W. N. W.		
10	4	5				
12	4					Variation 1 ½ Point Weſterly.

Courſe.	Diſt.	S.	W.	Lat. by D. R.	Lat. by Obſ.	Mer. Diſtance	Diff. Longitude	Long. in.	Bearings and Diſt.
S. 30° W.	107	93	53	46. 48		1° 41′ W.	1° 19′ W.	7. 46.	St. Mary's S. 53° W. 976 Miles.

The Variation being allowed on each Courſe, and the Diſtances ſummed up, as before taught, the Traverſe Table, and other Work, will be as follows:

TRAVERSE TABLE.

Courſes.	Diſt.	N.	S.	E.	W.
S. W. by S. ½ W.	43		33. 2		27. 3
S. S. W. ¼ W.	39		34. 4		18. 4
S. by W. ½ W.	27		25. 8		7. 8
			93. 4		53. 5

Now to Diff. of Lat. 93. 4. and Dep. 53. 5 the Courſe is 30°, and Diſtance 107 Miles.

To the Departure made Yeſterday 48 Miles, add the Depart. made this Day 53, gives 101 Miles, or 1° 41′ the Meridian Diſtance, as above.

Lat. from, or laſt Day's Lat.	48° 21′ N.		
Difference of Latitude	1 33 S.	Long. from, or laſt Day's Long.	6° 27′ W.
Latitude in, or Ship's Latitude	46 48 N.	Diff. Longitude.	1 19 W.
Sum Latitudes	95 09	Longitude in, or Ship's Long.	7 46 W.
Middle Lat.	47 35		
Com. Mid. Latit.	42 25		

And to Com. Mid. Lat. 42. 25, or 42°, and Departure 53. 5, the Difference of Longitude is 79 Miles.

Then for the Courſe and Diſtance from the Ship to St. Mary's.

Ship's Latitude	46° 48′ N.	3185	Ship's Longitude	7° 46′ W.
St. Mary's Latitude	37 00 N.	2393	St. Mary's Long.	25 6 W.

Diff. of Lat. 588 = 9 48 Mer. Diff. 792 Diff. Long. 1040 Miles. = 17° 20′

Hence the Courſe and Diſtance from the Ship to St. Mary's is found as above, by Caſe I. in Mercator's Sailing.

Note. As the Tables are only calculated to ſingle Degrees, the neareſt Degree to the Comp. of Middle Latitude is taken to find the Diff. of Long. by, which is near enough for all common Purpoſes at Sea; thus, the Com. of Mid. Lat. is 42° 25′, for which I take 42° to find the Diff. of Longitude.

It is immaterial whether the Diſtance of the intended Port, or any other Land you think proper to Note in your Journal, be kept in Miles or Leagues; there is only 1½ Point Variation here allowed, though in the Channel it is about 24° W. and as this is intended only to ſhow the Manner of keeping a Journal, the Error of Variation is of little Conſequence to the Learner.

H.	K.	F.	Courſes.	Winds.	Lee-way.	REMARKS on Board, Tueſday, May 6th, 1784.
2	4		S. W.	W. N. W.		Theſe 24 Hours moderate Gales and clear Weather.
4	4					
6	4					At 6 P. M. ſaw a Ship to the Northward.
8	4	4	S. W. by S.	W. by N.	½	
10	4	5				Obſerved the Sun's Zen. Diſt. at Noon 28° 20'S.
12	4	6				Declination — — 17 03 N.
2	4	5				So the Latitude is — — 45 23 N.
4	4		S. S. W.	Weſt	1	
6	4					
8	4					
10	4					
12	4					Variation 1 ½ Point Weſterly.

Courſe.	Diſt.	S.	W.	Lat. by D. R.	Lat. by Obſ.	Mer. Diſt.	Diff. Long.	Long. in.	Bearing and Diſtance.
S. 8° 30' W	97	96	14	45.12N	45.23	1.55 W	00 21	8.02	St. Mary's, S. 57° W. 920 Miles.

By allowing for Variation on each Courſe as before, and the Lee-way on the two laſt Courſes, the Work will be as follows.

TRAVERSE TABLE.

Courſes.	Diſt.	N.	S.	E.	W.
S. S. W. ½ W.	24		21.2		11.3
S. by W.	36		35.3		7.0
S. ½ E.	40		39.8	3.9	
	Diff. Lat.		96.3	3.9	18.3
					3.9
					14.4

Now to Diff. of Lat. 96,3, and Dep. 14.4, the Courſe is S. 8° 30' W. Diſt. 97 Miles.

Lat. from, or laſt Day's Lat.	46° 48'N.
Difference of Latitude	1 36S.
Latitude in by Account	45 12 N.
Sum Lats.	92 00
Middle Lat.	46 00
Com. Mid. Lat.	44 00

To Com. Middle Lat. 44, and Dep. 14, the Diff. of Long. is 21 Miles.

Long. from, or laſt Day's Long.	7° 46'W.
Difference of Longitude	0 21 W.
Longitude in by Accoudt	8 7 W.

Here the Latitude by D. R. differing 11 Miles from the Latitude by Obſervation, I correct for the true Longitude; and as this is the firſt Obſervation got ſince leaving the Land, I correct by Caſe I. Page 47, as follows;

		Mer. Parts.
Lizard's Lat.	49° 57'N.	3470
Ships Lat. by Account	45 12 N.	3047
Mer. Diff. of Lat. by Account		423
Lizard's Lat.	49° 57'N.	34 70
Ship's Lat. by Obſervation	45 23 N.	30 63
Mer. Diff. by Obſervation		407
Lizarp's Longitude	5° 14'W.	
Ship's Long. by Account	8 7 W.	
Diff. of Long. by Account	2 53=173 Miles	

To Mer. Diff. of Lat. by Account 423, and Diff. of Long. 173, the Courſe is 2 Points; and to Courſe 2 Points, and Mer. Diff. of Lat. by Obſervation 407, the Diff. of Long. is 167.

Lizard's Long.	5° 14'W.
True Diff. of Long.	168=2 48 W.
Ship's true Long.	8 2 W.

And to Courſe 2 Points, and Diff. of Lat. between Lizard and Ship 274, the Diſtance is 296 Miles.

Hence the Ship has ſailed from the Lizard S. S. W. 296 Miles, and the Courſe and Diſtance to the intended Port is found as above.

H.	K.	F.	Courſes.	Winds.	Lee-way.	REMARKS on Board, Wedneſday, May 7th, 1784
2	3	5	S. by W. ¾ W.	Weſt	1	Theſe 24 Hours moderate Gales and clear Weather.
4	3	5				
6	3	5				
8	3					At 8 P. M. ſet up the Main and Mizen Top-Maſt Shrouds and Back-Stays.
10	3	5				
12	3					
2	3					
4	3		S. by W.	W. by S.	1	
6	3					
8	3					
10	3					Variation is 1 ¼ Point nearly, or 13° 48′W. per Amplitude.
12	3					

Courſe.	Diſt.	S.	E.	Lat. by D. R.	Lat. by Obſ.	Mer. Diſt.	Diff. of Long.	Long. in.	Bearings and Diſtance
S. 9° E.	76	75	12	44°.8′		1° 43′	0° 17′	7° 45′W.	St. Mary's S. 61° 30 W. 898 Miles

Allowing for the Variation and Leeway, as before, the Work will ſtand as under:

TRAVERSE TABLE					
Courſes.	Diſt.	N.	S.	E.	W.
S. ½ E.	46		45.8	4.5	
S. by E. ¼ E.	30		29.1	7.3	
	Diff. Lat.		74.9	11.8	

Now to Diff. of Lat. 74.9 S. and Dep. 11.8 E. the Courſe is S. 9° E. Diſt. 76 Miles.

Lat. from, or laſt Day's Lat.	45° 23′N.
Diff. of Lat.	1 15 E.
Latitude in	44 8 N.
Sum Lats.	89 31
Mid. Lat.	44 45
Com. Mid. Lat.	45 15
And to Co. Mid. Lat. 45° 15′, or 45°, and Dep. 11.8, the Diff. of Long. is 16′ E.	
Long. from, or laſt Day's Long.	8° 2′W.
Diff. of Long.	0 17 E.
Longitude in	7 45

Having the Lat. and Long. in, the direct Courſe and Diſtance to the intended Port is found (by Mercator's Sailing) as above.

NOTE. When the Tenths on any Side are more than 5, or half a Mile, you muſt call that Side one more than you found it to be; but when they are leſs than 5, then you need take no Notice of them; as in the above the Difference of Latitude and Departure are 74.9 and 11.8, which I call 75 and 12, becauſe the Tenths are above 5.

But when you take the Difference of Latitude and Departure to find the Courſe by, then take them in Miles and Tenths, the ſame may be obſerved in caſting up the Knots and Fathoms.

If, when doubled, the Tenths are more than 5, ſet one Mile more in the Traverſe Table; but if leſs, omit them, as there are no Tenths in the Diſtance Column. Some keep an Account of the Longitude made from the Place they take their Departure from, which is here omitted; thoſe that chuſe may make a Column for it.

H.	K.	F.	Courſes.	Winds.	Lee-way.	Remarks on Board, Thurſday, May 8th, 1784.
2	3	5	W. Handed	S. S. W.	3	Theſe 24 Hours hard Gales and ſqually,
4	3	5	Main-Sail			with ſmall Rains.
6	3	5	Handed Fore-	Sail		
8	Lay	too	up N. W. by N.	off N. by E.		
10	drift	1½	Mile per Hour	W.	5	Saw a Ship to Windward with her Jury-
12	up.	N W	off N.	W. by S.	5	Maſts up.
2						
4						
6	Set	the	Fore Sail cloſe	reefed	and	Main Sail, more moderate.
8	5		S. W.	N W by W½W	½	Set Top Sails cloſe reefed.
10	5					
12	5					Variation 1¼ Point Weſterly.

Courſe.	Diſt	S.	W.	Lat. by D. R.	Lat. by Obſ.	Mer. Diſt.	Diff. of Long.	Long. in	Bearing and Diſt.
S. 81° 30′ W.	25	4	25	44° 4′ N.		2° 8′	35′ W.	8° 20′ W.	St. Mary's S. 61° W. 876 Miles.

Taking the Middle Point between the Point on which the Ship comes up, and the Point which ſhe falls off for the ſecond and third Courſes, as taught in the Rules for lying-to, and then allowing as before for the Variation and Leeway, the Traverſe Table will ſtand as follows:

Courſes.	Diſt.	N.	S.	E.	W.
W. N. W. ¼ W.	21	7.1			19.8
N. N. E. ¾ E.	9	7.7		4.6	
N. by E. ¾ E.	9	8.5		3.0	
S. S. W. ¼ W.	30		27.1		12.8
		23.3	27.1	7.6	32.6
			23.3		7.6
			3.8		25.0

Now to Diff. of Lat. 3.8 S. and Dep. 25 W. the Courſe is 81° 30′ W. Diſt. 25 Miles.

Lat. from, or laſt Day's Lat.	44° 08′ N.
Diff. of Lat.	00 04 S.
Lat. in	44 04 N.
Sum Lats.	88 12
Middle Lat.	44 06
Com. Mid. Lat.	45 54

And to Com. Mid. Lat. 45° 54′, or 46°, and Deg. 25, the Diff. Long. is 35 Miles.

Long. from, or laſt Day's Long.	7° 45′ W.
Diff. of Long.	0 35 W.
Long. in.	8 20

Then to find the Courſe and Diſtance to St. Mary's;

Ship's Lat.	44° 4′ N.	2952	Ship's Long.	8° 20′ W.
St. Mary's Lat.	37 00	2393	St. Mary's Long.	25 6 W.
Diff. of Lat. 424 Miles =	07 04	Mer. 559	Diff. of Long. 1006 =	16 46

Hence the Courſe and Diſtance from the Ship to the intended Port is found as above.

Note. The Difference of Longitude each Day is found by Middle Latitude Sailing, which is ſufficiently exact for any ſingle Day's run in theſe Latitudes, but the Bearing and Diſtance of the Land is found by Mercator's Sailing, (Caſe I.)

H.	K.	F.	Courſes.	Winds.	Lee-way.	REMARKS on Board, Friday, May 9th, 1784.
2				Calm.		The firſt 8 Hours calm and foggy, the reſt ſtiff Gales and clear.
4						
6						
8						A Current all Day ſetting N. W. by N. one Mile per Hour.
10	3	5	W. S. W.	S. E.	1	
12	4	4				
2	4	6				
4	4	8				
6	4	6				
8	4	8				
10	4	8				
12	4	5				Variation 1¼ Point Weſterly.

Courſes.	Diſt.	S.	W.	Lat. by D. R.	Lat. by Obſ.	Mer.Diff.	Diff. of Long.	Long. in	Bearing and Diſt
S. 8° W.	84	15	83	43°49'N.	43° 34'N.	3° 31'W.	2° 3'	10° 4'W.	St.Ma.S.60°W W. Diſt.790M.

The ſetting of the Current and its Drift in 24 Hours being made a Courſe and Diſtance, as has been taught, and the Variation and Leeway allowed for as before, the Work will be as follows:

TRAVERSE TABLE.

Courſes.	Diſt.	N.	S.	E.	W.
S. W. by W. ½ W.	72		30. 8		65. 1
N. W. ¼ W.	24	6. 1			17. 8
		16. 1	30. 8		82. 9
			16. 1		
			14. 7		

Now to Diff. Lat. 14.7 S. and Dep. 82.9, W. the Courſe is S.80° W. Diſt. 84M. Lat.

from, or laſt Day's Lat.	44°	4'N.
Diff. Lat.	00	15 S.
Latitude in	43	49 N.
Sum Lats.	87	53
Middle Lat.	43	57
Com. Mid. Lat.	46	3

And to Com. Mid. Lat. 46° 3', or 46°, and Dep. 82.9 the Diff. of Long. is 115 Minutes.

Long. from, or laſt Day's Long.	8°	24'W.
Diff. Long.	1	55
Long. in my Account	10	15

But the Lat. by Obſervation differing from the Lat. by Account, I correct for the true Long. and as our laſt Obſervation was three Days ago, I work as follows: (See Caſe II. Page 47.)

		M. Pts.
Laſt obſerved Lat.	45° 23 N.	3063
Ship's Lat. by Account	43 34 N.	2231
Mer. Diff. by Account		132
Laſt obſerved Lat.	45° 23'N.	3063
Ship's Lat. by Obſ.	43 34 N.	2910
Mer. Diff. of Lat. by Obſ.		153
Long. at laſt. Obſ.	8° 1'	
Ship's Long. by Acc.	10 15	
Diff. of Long. by Acc.	2 14=134 Miles.	

To Mer. Diff. of Lat. by Acc. 132, and Diff. of Long. by Account 134, the Diſtance is 190.

And to Diſt. 190, and Mer. Diff. of Latitude by Obſervation 153, the Diff. of Longitude is 112.

Then 134+112=246, half this Sum 123 is the true Diff. of Long.

Long. at laſt Obſervation	8°	1'W.
Diff. of Long. 123=	2	3 W.
Ship's true Long.	10	4

H.	K.	F.	Courſes.	Winds.	Lee-way.	Remarks on Board, Saturday, May 10th, 1784.
2	4	5	W. S. W.	S.		Theſe 24 Hours moderate Gales, with Showers of Rain. A great Swell from the S. W. for which I allow 6 Minutes.
4	4	5				
6	4	5				
8	4					
10	4					
12	4					
2	3	5				
4	3	5	S. W. by W.	S. by E.		
6	3	5				
8	3					
10	3					
12	3					Variation 1 Point per Azimuth.

Courſe.	Diſt.	S.	W.	Lat by D. R.	Lat. by Obſ.	Mer. Dif.	Dif. Lon.	Lon. in	Bearing and Diſt.
S. 53° W.	83	50	67	42° 44′N.		4° 38′	1° 33′W.	11° 37′	St. Mary's S. 61 S. W. Diſt. 710 Miles

In this Day's Work the Swell is to be conſidered as a Current, whoſe Drift in 24 Hours is 6 Miles, the Allowance made for the Swell; and as it comes from the S. W. it heaves the Ship towards the N. E. and the Variation allowed upon it makes laſt Courſe N. E. by N. as in the Traverſe Table.

TRAVERSE TABLE.

Courſes.	Diſt.	N.	S.	E.	W.
S. W. by W.	58		32. 2		48. 2
S. W.	32		22. 6		22. 6
N. E. by N.	6	5		3. 2	
		5	54. 8	3. 3	70. 8
			5		3. 3
			49. 8		67. 5

Now to Diff. of Lat. 49.8 S. and Dep. 67.5 W. Courſe S. 53° W. Diſt. 83 Miles.

Lat. from, or laſt Day's Lat.	43°	4′N.
Diff. of Latitude	00	50 S.
Latitude	42	44 N.
Sum Lats.	86	18
Mid. Lat.	43	09
Com. of Mid. Lat.	46	51

And to Com. Mid. Lat. 46° 51′, or 47°, and Dep. 67.5, the Diff. of Long. is 93 Miles.

Long. from	10°	14′W.
Diff. of Long. 93 Miles	1	33
Long. in.	11	37

To find the Bearing and Diſtance of the intended Port, on Mercator's Chart.

Lay a Ruler acroſs Mercator's Chart, in Lat. 42° 44′, and ſet one Foot of the Compaſſes on the Meridian of London, and the other in Long. 11° 37′W. lay off that ſame Diſtance from the Meridian of London, by the Edge of the Ruler, and that will ſhew the Ship's Place. Then lay the Ruler over the Ship's Place and St. Mary's, and take the neareſt Diſtance between the Ruler and Center of the Compaſs, ſlide one Foot along the Side of the Ruler, and the other Foot will ſhew the Courſe to be S. W. by W. ½W. Then take in your Compaſſes the Diſtance between the Ship and St. Mary's, and apply it to the Meridian (ſometimes marked with Leagues) taking Care that the Points of the Compaſſes are as much above the one Place as they are below the other; the Degrees, or Leagues, between the Points will be the Diſtance: thus, the Diſtance between the Ship and St. Mary's laid on the Meridian, is about 11¾ Degrees, or 705 Miles=235 Leagues. In like Manner may the Bearing and Diſtance between any two Places be found, and the Ship's Way pricked off upon the Chart by the Courſe and Diſtance made good every Day, as many do, without finding the Difference of Longitude as practiſed by the Dutch, and others, though not ſo correct as to find the Longitude every Day.

H.	K.	F.	Courſes.	Winds.	Lee-Way	REMARKS on Board, May 11th, 1784.
2	3	5	S. W. by W. ½ W.	S. E. ½ E.	o	Moderate and Hazy Weather.
4	4					
6	4	6				Made more Sail.
8	5		S. W. ½ W.		o	
10	6	4				
12	7					Set Top Gallant Sails.
2	7	3				
4	7	2				
6	7	3	S. W. by W.	S. by E.	½	
8	7	4				
10	7	5	S. ½ W.	E. S. E.	o	
12	7	4				Variation ¾ Point Weſterly.

Courſe	Diſt.	S.	W.	Lat. by D. R.	Lat. by Obſ.	Mer. Diſt.	Diff. Lon.	Long. in.	Bearings and Diſtance
S. 40′ E.	141	108	90	40.56		6° 8′ W.	2° 1′ W.	13.38W.	St Mary's bears S. 66° W. Diſtant 580 Miles.

TRAVERSE TABLE.					
Courſes.	Diſt.	N.	S.	E.	W
S. W. by W. ½ W	24		12. 3		20. 6
S. W. by S. ½ W.	66		48. 9		44. 3
S. W. ½ W.	29		17. 3		23. 3
S. ½ W.	30		30. 0		1. 5
	Diff. Lat.		108. 5	Dep.	89. 7

Lat. from	42	44
Diff. Latitude	1	48
Latitude in	40	56
Sum	83	40
Middle Latitude	41	50
	90	
Com. of Middle Latitude	48	10

To Comp. Mid. Lat. 48, and Dep. 89.7, the Diff. of Long. is 121.

Longitude from	11	37
Diff. Longitude 121 =	2	1
Longitude in	13	38

Ship's Latitude	40°	56′	Mer. Parts	2696	Ship's Long.	13°	38′
Lat. of St. Mary's	37	00	Mer. Parts	2393	St. Mary's Ditto	25	6
Proper Diff. of Lat.	3	56	Mer. Diff. Lat.	303	Diff. Longitude	11	28
	60					90	
In Miles	236				In Miles	688	

Hence the Courſe and Diſtance is found as above by Inſpection.

H.	K.	F.	Courſes.	Winds.	Lee-way.	REMARKS on Board, May 12th, 1784.
2	7	3	W. by S.	E. S. E.		Freſh Breezes and Squally with Rain.
4	7	4				
6	8					
8	7	6				
10	8	2	W.	S. E.		In Top-Gallant Sails.
12	8	3				
2	8	2				Saw a Strange Sail on our Lee-bow, ſtanding on the ſame Courſe with us; ſhe ſeemed to be a Snow deep laden.
4	7	7				
6	8	2	W. by N.			
8	7	5				
10	6	7				
12	6	6				Variation ¾ Point Weſterly.

Courſe.	Diſt.	S.	W.	Lat. by D. R.	Lat. by Obſ.	Mer. Diff.	Diff. Lon.	Long. in	Bearings and Diſtance
S. 80° 30′ W.	182	30′	179	40° 26′	40° 20′	9° 7′		17° 36′	St. Mary's b. S. 60° 30′ W Diſtant 460 Miles.

TRAVERSE TABLE.					
Courſes.	Diſt.	N.	S.	E.	W
W. S. W. ¼ W.	77		25.9		72.5
W. by S. ¼ W.	48		7.0		47.5
W. by N. ¾ W.	58	2.9			57.9
			32.9		
			2.9		
		Diff. Lat.	30	Dep.	177.9

Lat from	40°	56′
Diff. Lat.	0	30
Lat. in	40	26
Sum of Lat.	81	22
Mid. Lat.	½)40	41
	90	
Co. Mid. Lat.	49	19

Now to Diff. of Lat. 30 M. and Dep. 178, the Courſe is S 80° 30′ W. and Diſtance 182 Miles, and to Com. Mid. Lat. 49° 19′ and Dep. 178 M. the Diff. Long. is 236 M. = 3° 56

Long. from	13	38
Longitude in	17	34

But the Lat. by Account differing from the Lat. by Obſervation, I muſt correct for the true Longitude, and as it is two Days ſince my laſt Obſervation, I correct it as follows, by Rule III, Page 48.

			M. Parts.
Laſt Obſ. Lat.	43°	34′	2910
Lat. by Acc.	40	26	2657
Mer. Diff. Lat. by Account			253
Laſt Obſ. Lat.	43	34	2910
Lat. by Obſ.	40	20	2649
Mer. Diff. Lat. by Obſ.			261
Long. at laſt Obſ.	10	4	
Long. in by Account	17	34	
Diff. Long. by Account	7	30 = 450	

To Mer. Diff. Lat. by Account 253 M. and Diff. Long. by Account 450 Miles, the Diſt. is 522 M. over 61°

And to the Diſt. 522 M. and Mer. Diff. Lat. by Obſ. 261 M. the Diff. Long. is 452 M. the true Diff. Long.

Long. at laſt Obſ.	10°	4′
Diff. Long. 452 M.	7	32
True Long. in	17	36

H.	K.	F.	Courſes.	Winds.	Lee-way.	REMARKS on Board, May 13th, 1784.
2	6	6	S. W.	S. S. E.	2	Freſh Breezes and Cloudy.
4	7	2				
6	7	5				
8	6	8				
10	6	4	S. S. W.	S. E. by E.	1	A Current ſetting W. ¾ S. all theſe 24 Hours ½ a Mile an Hour.
12	5	7				
2	5	2				
4	5	5				Made more Sail the Breeze ſeeming to fall away.
6	6	2	W. S. W.	S. ½ E.	1½	
8	5	8				
10	4	8				Variation ¼ Point Weſterly per Azimuth obtained this Evening.
12	4	6				

Courſe.	Diſt.	S.	W.	Lat. by D. R.	Lat. by Obſ.	Mer. Diſt.	Diff. Lon.	Long. in	Bearing and Diſtance.
S. 51 30 W.	126	78	98	39. 2		10. 45 N.	2° 8′	19° 44′	St. Mary's b. S. 64° W Diſtant 282 Miles.

TRAVERSE TABLE.					
Courſes.	Diſt.	N.	S.	E.	W.
S. W. by W. ¼ W.	56		28. 8		48. 0
S. S. W. ¼ W.	45		40. 7		19. 2
W. S. W. ¼ W.	44		10. 7		42. 7
E. by N.	12	2. 3		11. 8	
			80. 2	11. 8	1099
			2. 3		11. 8
	Diff. Lat.		77. 9	Dep.	98. 1

To Diſt. Lat. 78 M. and Dep. 98 M. 1, the Courſe is S. 51° 30′ Diſt. 126 Miles.

Lat. from	40° 20′
Diff. Lat.	1 18
Lat. in	39 2
Sum	79 22
½)	
Mid. Lat.	39 41
Co. Mid. Lat.	50 19

To Co. Mid. Lat. 50° 19′ and Dep. 98 M. the Diff. Long. is 128 — 2° - 8′ W.

Long. from	17 36 W.
Long. in	19 44 W.

Ship's Lat.	39° 2′	Mer. Diff.	2548	Ship's Long.	19° 44′
St. Mary's Lat.	37 0		2393	St. Mary's Ditto	25 6
	2 2	Mer. Diff. Lat.	155		5 22
	60				60
Proper Diff. Lat.	122			Diff. Long.	322

Hence the Bearing and Diſtance is found as above.

H.	K.	F.	Courſes.	Winds.	Leeway.	Remarks on Board, May 14th, 1784.
2	4	6	S. W.	S. E. by S.	1	Moderate Breezes and Hazy Weather.
4	5					
6	5	4				Unſtowed the Anchors and bent the Cables.
8	5	6				
10	6		S. W. by W.	S. S. E.	½	
12	6	3				The Breeze falling off, got out Booms and ſet Steering Sails.
2	5	7				
4	5	2				
6	6					
8	6	3	W. by S.	S. E.		
10	6	7				
12	7	2				
						Variation ½ Point Weſterly.

Courſe.	Diſt.	S.	W.	Lat. by D. R.	Lat. by Obſ.	Mer. Diſt.	Diff. Lon.	Long. in.	Bearings and Diſtance
S. 58° W.	138	73	117	37.49		12° 42′ W.	2° 30′W.	22° 14′	St. Mary's S. 70° 30W. Diſtant 146 Miles.

Traverse Table.

Courſes.	Diſt	N.	S.	E.	W.
S. W. ¼ W.	41		27.7		30.4
S. W. ¾ W.	46		27.4		36.9
W. by S. ¾ W.	53		17.9		49.9
	Diff. Lat.		73.0	Dep	117.2

With Diff. of Lat. 73 M. and Dep. 117 M. the Courſe is S. 58° W. Diſt. 138 Miles.

Lat. from	39°	2′
Made Diff. Lat.	1	13
Lat. in	37	49
Sum	76	51
½ Mid. Lat.	38	25
Co. Mid. Lat.	51	35

With Co. Mid. Lat. 51° 35′ and Dep. 117.2 the Diff. Long. is 150 M. = 2° 30′

Longitude from	19	44
Longitude in	22	14

Ship's Lat.	37° 49′	Mer. Parts	2454	Ship's Long.	22° 14′
St. Mary's Lat.	37 00	Mer. Parts	2393	St. Mary's Ditto	25 6
Proper Diſt. Lat.	49	Mer. Diff. Lat.	61	Diff. Long.	2 52 = 172

H.	K.	F.	Courſes.	Winds.	Lee-way.	REMARKS on Board, May 15th, 1784.
2	7	4	W. by S.	S. E.		Freſh Breezes and Cloudy.
4	7	7				
6	8	2				At 8 A M. ſaw the Iſland of St. Mary's bearing S. Diſt. 5 Leagues, and ſtood in for the Harbour with a ſmart Breeze.
8	8	5				
10	8	5	W.			
12	7	4				
2	8	2				
4	7	6				
6	7	5				
8						
10						
12						Variation 1 ¼ Point Weſterly.

Neceſſary Remarks on coming into the Channel.

Perſons coming from a long Voyage, without Doubt, try for Ground in Time, and, if poſſible, would keep in the Latitude of 49° N. in which Latitude, and in ninety Fathoms Water, you will have fine Sand ſixty-ſix Leagues from the Lizard; but, ſhould you be in the Latitude of Scilly, then coarſe Ground and eighty Fathoms. In coming in, having ſtruck Ground in ninety Fathoms, you will, from the Latitude 49° 30′ to 49°, meet with the ſame Depth: then, ſailing ſix or ſeven Leagues, you will ſhoal five Fathoms at once; you run in that Depth for ſome Time, and deepen again; and perhaps in three Leagues you ſhoal again; for it is to be ſuppoſed the Ground is not gradual: You muſt therefore have Recourſe to the general Soundings, not to Particulars. But, if, in coming in, you meet with Sand interſperſed with black Specks like beaten Pepper, and you have ſixty-four Fathoms, then Scilly bears N. E. by N. fourteen Leagues; and if, at any other Depth, you have the ſame Soundings from ninety to ſixty-four Fathoms, you have the Channel fairly open. When you are in the Latitude of 49° 30′, and have ſeventy-five Fathoms, you muſt be ſure to ſteer E. by S. or E. S. E. and then you will but keep your Latitude good; which, if poſſible, do not go to the Northward of, till you get within Scilly; nor then, without you have an Opportunity of making the Land. When you are a-breaſt of Scilly, if you be not to the Southward of 49° 25′, nor to the Northward of 49° 20′, and have ſixty Fathoms, you are ſure to be the Length of Scilly, and in the Latitude as before-mentioned; with thirty-five Fathoms you are a-breaſt of the Lizard.

If at any Time you ſhould be to the Southward, and have from ninety to ſeventy Fathoms, or in the Latitude of Uſhant, or farther Southerly, you will have reddiſh Gravel Sand, with many Pieces of Shells; which Soundings are no where to be found in the Channel. If in the Latitude of Uſhant you have eighty-ſix Fathoms, you are diſtant from thence thirty-ſix Leagues: if ſeventy Fathoms, eleven Leagues; then you muſt be careful in the Night or thick Weather to come no nearer to it than ſixty-three Fathoms, nor to the Leams than ſixty-five Fathoms. You may know when you are to the Northward or to the Southward of Scilly by the Ground. When you are to the Northward, or in the Latitude of it you have Ouze on the Lead from eighty-five to ſixty Fathoms; then you muſt haul to the Southward till you meet with coarſer Ground, which you will have to the Southward of Scilly; you may depend on having Ouze on the Lead in this Latitude, or to the North of it, ſo that if you keep the Lead going, you may prevent falling to the Northward. For your better knowing when you are near Scilly, you will find on the Lead black Stones, the like of which are no where elſe in the Channel. In the Night come no nearer than fifty three Fathoms; and in that Depth you are not above three Leagues from the Scilly Rocks. That you may know if you be within Scilly, and in the Channel, ſtand to the Southward, and you will have deeper Water; to the Northward, and you will have ſhoaler. Come no nearer to the Lizard, in the Night, than forty five Fathoms. If running up the Channel in the Night, keep without the Stream of forty Fathoms, for in that Stream the Eddyſtone lies: between the Start and Portland, no nearer than twenty-four Fathoms; nor from Portland to the Neſs, than twenty Fathoms; if in the Night or thick Weather. When you are in the Fair-way, up Channel, you will always have fine Sand, intermixed with black Speck's and Hake's Teeth. By this Time you will moſt probably have made the Land; but obſerve that between Beachy and the Wight there are from thirty to thirty-eight Fathoms Water; by which you may be led to imagine yourſelf farther out than you are. That Depth is found at four Leagues Diſtance from the Owers and Eaſtborough Head.

To find the Sun's true Amplitude by Calculation.

RULE. To the Secant leſs Radius of the Latitude
Add the Sine of the Sun's Declination,
The Sum is the Log-ſine of the Sun's true Amplitude,

Which is always of the ſame Name with the Declination, whether North or South.

EXAMPLE I.

On the 20th of October, 1783, in Latitde 51° 32′ North. I demand the Sun's true Amplitude?

Sec. leſs Radius of Lat. = 51° 32′ = 0,20617
Sine of Sun's Declin. = 10 25 = 9,25721

North Amplitude 16 53 N. 9,46338

EXAMPLE II.

In Latitude 38° 25′ N. what is the Sun's true Amplitude when the Declination is 18° 59′ S.

Secant leſs Radius Lat. 38° 25′ = 0,10595
Add Sun's Declination 18 59 = 9,51227

Sine Amplitude S. 24° 32′ 9,61822

To find the true AZIMUTH.

The true Azimuth is an Arch of the Horizon, contained between the Meridian of the Place and the Azimuth Circle, paſſing through the Centre of the Sun or Star at the Time of Obſervation; or it is the true Diſtance of the Sun or Star from the true North and South Points of the Compaſs.

The Magnetic Azimuth is the apparent Diſtance of the Sun or Star from the North or South Points of the Compaſs, either in the Forenoon or in the Afternoon, when they are 5°, 10°, 15°, &c. above the Horizon, and is found in the following Manner:

Set the Box ſo that the four Cardinal Points of the Card ſtand oppoſite to the four Lines in the Compaſs Box: hold the Box in this Poſition, and move the Index, till the Sights being directed to the Sun or Star's Centre, the Shadow of the String joining the Sights fall directly along the Middle of the Index; then the Degree, &c. in the Arch intercepted between the End of the Index next the Sun, and North Point of the Card, will give the Magnetic Azimuth required. If the Sun does not ſhine ſtrong enough to give a ſtrong Shadow, look through one of the Sights, and move the Index till one of the Strings cuts the Sun's Centre, and then the intercepted Arch, as before, ſhews the Sun's Azimuth, and the like of the Star's.

When there is a rough Sea, the Obſervation is beſt made by two Perſons, and if the Card vibrates much take the middle Degree between the Limits which the Vibration reaches.

When the Azimuth is obſerved, the Altitude of the Object muſt be obſerved at the ſame Time.

Having the Latitude of the Place of Obſervation, and the Sun or Star's Declination with the Altitude at the Time of Obſervation, the true Azimuth is found as follows:

Rule. Add the Complement of the Latitude, the Complement of the Altitude, and the Sun or Star's Polar Diſtance into one Sum: From Half that Sum ſubtract the Polar Diſtance, and note the Half Sum and the Remainder.

Then add together
The Secant-leſs Radius of the Latitude.
The Secant-leſs Radius of the Altitude.
The Sine of the Half Sum,
And the Sine of the Remainder into one Sum.

Half the Sum of theſe four Logarithms will give the Co-ſine of Half the true Azimuth, which, being doubled, gives the true Azimuth, reckoned from the North in North Latitude, and from the South in South Latitude.

N. B. The Polar Diſtance of the Sun or Star, is their Diſtance from the neareſt, or elevated Pole, and if the Latitude of the Place, and the Declination of the Sun or Star, be both North or both South, then the Complement of the Declination is the Polar Diſtance; but if the Latitude and Declination be one North and the other South, the Declination added to 90° gives the Polar Diſtance.

EXAMPLE I.

In Latitude 43° 39′ N. the Sun's Altitude was obſerved to be 39° 28′, his Declination being then 16° 37′ North, required his Azimuth?

	90°	00′		90°	00		90°	00′
Lat.	43	39	N. Altitude	39	28	Declination	16	37
Co. Lat,	46	21	Co. Alt,	50	32	Polar Diſt.	73	23

Note. The Secant leſs Radius (being the ſame as the Arithmetical Com. of the Co-Sine) is here uſed as being more familiar to the Generality of Seamen, and is found by omitting the firſt Figure in the Secant's Index; thus the Secant of 43° 39′ is 10.14052, and omitting the 1, in the Index leaves 0,14052, the Secant leſs Radius of 43° 39.′

Comp. Lat.	46	21	Lat.	43°	39′	Secant leſs Rad.	0,14052
Comp. Alt.	50	32	Alt.	39	28	Secant leſs Rad.	0,11239
Polar Diſt.	73	23	Half Sum	85	8	Log. Sine	9,99843
			Rem.	11	45	Log. Sine	9,30887
Sum	170°	16′					
			Sum of the four Logarithms				19,56021
Half Sum	85	8					
Sub. Po. Diſt.	73	23	Half the Sum Co ſine	52	56		9,78010
Remainder	11	45					

And 52° 56′ doubled, gives 105° 52′ for the Sun's true Azimuth to be reckoned from the North.

E X A M P L E II.

In Latitude 42° 16′ N. the Sun's Altitude was obſerved to be 18° 40′ his Declination being then 7° 38′ S. required his Azimuth ?

	90°	00′		90°	00′		90′	00′
Lat:	42	16 N.	Alt.	18	40	Decl.	7	38 S.

Comp. Lat.	47°	44′	Co. Alt. 71 20 Po. Diſt.	97	38	
Comp. Alt.	71	20	Secant leſs Radius of Lat.	42	16	0,13076
Polar Diſt.	97	38	Secant leſs Radius of Alt.	18	40	0,02347
			Sine of the Half Sum	108	21	9,97733
			Sine of the Remainder	10	43	9,26940
Sum	216	42				
			Sum of the four Logarithms			19,40096
Half Sum	108	21				
Sub. Po. Diſt.	98	38	Half the Sum is equal to Co-ſine	59	53	9,70048
Remainder	10	43				

And 59° 53′ doubled, gives 119° 46′ for the Sun's true Azimuth to be reckoned from the North.

Having found the Sun's true Amplitude, or Azimuth, by the preceding Methods, and Magnetic Amplitude or Azimuth by Obſervation, it is evident, that when they agree there is no Variation ; but when they diſagree, then, if the true and obſerved Amplitudes be both of the ſame Name, that is, both North or both South, their Difference is the Variation ; but if the true and obſerved Amplitudes be of different Names, that is, one North and the other South, their Sum is the Variation. Again, if the true and obſerved Azimuths be both on the Eaſt, or both on the Weſt Side of the Meridian, their Difference is the Variation ; but if the true and obſerved Azimuths be one on the Eaſt and one on the Weſt Side of the Meridian, their Sum gives the Variation ; and to know whether the Variation is Eaſterly or Weſterly, obſerve this general Rule, viz.

Let the Obſerver's Face be turned to the Sun, then, if the true Amplitude or Azimuth be to the Right Hand of the Magnetic, or Obſerved, the Variation is Eaſterly, but if to the Left Hand, Weſterly.

EXAMPLE I.

Suppoſe the Sun's true Amplitude at Riſing is E. 13° 24′ N. and his Magnetic Amplitude E. 12° 32′S. required the Variation and which Way?

Since the true Amplitude and obſerved have different Names,

To the true Amplitude E. 13° 24′N.
Add the Mag. Amp. E. 12 32 S.

The Sum is the Variation 25 26W.

which is Weſterly becauſe the true Amplitude is to the Left of the Obſerved.

EXAMPLE III.

Suppoſe the Sun's true Amplitude at Riſing is E. 13° 30′ N. and his Magnetic Amplitude E. 12° 30′ S. required the Variation, and which Way.

Since the true Amplitude and Obſerved have different Names.

To the true Amplitude E. 13° 30′N.
Add the Obſ. Amp. E. 12 30 S.

Sum is the Variation 23 00W.

Which is Weſterly, becauſe the true Amplitude is to the Left of the Obſerved.

EXAMPLE II.

Suppoſe the Sun's true Azimuth in the Forenoon is N. 86° 40′ Eaſterly, but by the Compaſs it is N. 73° 24′ Eaſterly, required the Variation, and which Way?

Since the true and obſerved Azimuth are both on the ſame Side of the Meridian,

From the Greater N. 86° 40′E.
Take the Leſſer N. 73 24 E.

Remainder Variation 13 16 E.

which is Eaſterly, becauſe the true Azimuth is to the Right of the obſerved.

EXAMPLE IV.

Suppoſe the Sun's true Amplitude is E. 1° 50′, and Magnetic Amplitude E. 32° 28′ required the Variation, and which Way?

To the obſerved Amp. E. 32°28′N.
Add. the true Amp. E. 1 50N.

Sum is the Variation 34 18 E.

Which is Eaſterly, becauſe the true Azimuth is to the Right of the Obſerved.

The New Method of finding the LATITUDE at SEA, by taking two Altitudes, either in the Forenoon or Afternoon, having the intermediate Time meaſured by a common Watch, with Eaſe and Accuracy, independent of the Sun's Meridian Altitude.

GENERAL RULES.

TO the Secant leſs Radius of the Latitude by Account, add the Secant leſs Radius of the Sun's Declination, call that Sum the Logarithm Ratio.

From the Natural Sine of the greateſt Altitude, ſubtract the Natural Sine of the leaſt Altitude, and find the Logarithm of their Difference, and write it under the Logarithm Ratio.

Subtract the Hours and Minutes when the Altitudes were taken from each other, and Half the Difference call Half-elapſed Time.

With Half the elapſed Time enter theſe Tables, and from the Column of Half-elapſed Time take out the Logarithm anſwering thereto, and ſet it down under the Logarithm Ratio.

Add theſe three Logarithms together, and with their Sum enter the Tables in the Column of Middle Time, where, having found the Logarithm neareſt thereto, take out the Time correſponding to it, and put it down under Half the elapſed Time.

Subtract the Leſs from the Greater, and the Difference will be the Time from Noon, when the greateſt Altitude was taken.

With this Time enter the new Tables, and from the Column of Riſing, take out the Logarithm correſponding to it; from this Logarithm ſubtract the Logarithm Ratio, the Remainder will be the Logarithm of a Natural Number, which, being found in any common Table of Logarithms, and added to the Natural Sine of the greateſt Altitude, will give the Natural Sine of the Sun's Meridian Altitude.

Having the Meridian Altitude of the Sun at Noon, the Latitude is found by the uſual Method.

N. B. If the Latitude, found by the above Proceſs, ſhould differ widely from the Latitude by Account, it will be proper to repeat the Operation; uſing the Latitude laſt found inſtead of the Latitude by Account, till the Reſult gives a Latitude nearly agreeing with the Latitude uſed in the Computation. The obſerved Altitude muſt be corrected for the Dip, Refraction, and Semi-diameter, as ſhewn in Page 30, before you begin the Operation.

EXAMPLE I.

Being at Sea in Latitude 46° 50′ North by Account, when the Sun's Declination was 11° 17′ N. at 10 H. 2 M. in the Forenoon, the Sun's Altitude was 46° 55′, and at 11 H. 27 M. in the Forenoon, the Second Altitude was 54° 9′. Required the true Latitude, and true Time of the Day when the greateſt Altitude was taken?

Times

Times.
H. M. S. Lat. 46° 50′. Secant leſs Radius 0.16487
11 27 0
10 2 0 Dec. 11 17 Secant leſs Radius 0.00848

Ela. T. 1 25 0 Added gives the Log. Ratio 0.17335

½ El. T. 0 42 30

The Sun's gr. Alt. at 11 H. 27 M. is 54° 9′ Its Nat. Sine 81055
The Sun's leaſt Alt. at 10 H. 2 M. is 46° 55′ Its Nat. Sine 73036

The Remainder or Diff. of Nat. Sines .8019

Log. Ratio —— —— —— 0.17335
The Common Log. of the Diff. N. S. 80.19 3.90412
In the New Tables in Col. ½ Ela. Time for 42 M. 30 S. is 0.73429

Their Sum of the Log. in Middle Time —— 4.81176

H. M. S.
The H. M. &c. for which by the New Table is 1 15 30
Subtract Half-elapſed Time —— —— 42 30
The Diff. is the true Space of Time the Sun had to riſe to the Meridian when the greateſt Altitude was taken —— —— —— } 0 33 00

H. M.
Time per Watch 11 27
Sub. from 12 0

0 33 Finding they agree, the Watch is right.

Enter the Tables with 33 M. under Col. of Riſing, and you will find the Log. —— } 3.01488
From which ſubtract the Log. Ratio —— 0.17335

The Natural Number of which is 694 —— 2.84153

To the Natural Sine of the greateſt Alt. —— 81055
Add the Natural Number of the above Log. —— 694

The Sum is the Natural Sine of the Sun's Meridian Altitude, 54° 50′ } 81749

90° 0′

54 50

The Sun's Zen. Diſt. 35 10 } By obſerving the Sun's Merid. Alt. the ſame Day the Lat. was found to be 46° 28′N.

The Sun's Decl. 11 17

Lat. — 46 27

E X A M P L E II.

Being at Sea in Lat. 47° 19′N. by Account, when the Sun's Declination was 12° 16′N. at 10 H. 24 M. A. M. per Watch, the Sun's Alt. was 49° 9′, at 1 H. 14 M. P. M. his Alt. was 51° 59′. Required the Latitude ?

12 0 0 Alt. Nat. S. Lat. 47° 19′ 0,16880

10 24 0 49° 9′ 75642 Sun's Dec. 12 16 0,01003

51 59 78783

1 36 0 Log Ratio 17883

1 14 0

El. T. 2 50 0 Diff. N. S. 3141 Its Log. 3.49707

½ El. T. 1 25 0 Its Log. in Col. of half Elap. Time is 0,44077

Sub. 0 15 0 Col. of Mid. Time correſponding to 4,11667

True T. 1 10 0 Its Log. in Col. of Riſing is 3,66542

T. p. W. 1 14 0 Log. Ratio Sub. 0,17883

Wat. faſt 0 4 0 3066 the Nat. Num. of this Log. 3,48659

N. S. Sun's gr. Alt. 78783 90 00

N. S. S. Mer. Alt. 81849=54 56

Sun's Zen. Diſt. 35 4

Sun's Decl. 12 16

Lat. in 47 20 North.

Here the Latitude found by Computation may be relied on, as it differs but one Mile from that uſed in the Operation.

EXAMPLE III.

Being at Sea in Lat. 50° 40′ North per Account, when the Sun's Declination was 20° 0′ South, at 10 H. 17 M. A. M. per Watch, the Sun's Alt. was found 17° 13′, at 11 H. 17 M. A. M. per Watch it was found 19° 41′. Required the Latitude?

Times.	Alt. Nat. S.	Lat. 50° 40′	0,19803
H. M. S.		Decl. 20 00	0,02701
10 17 0	17° 13′=29599		
11 17 0	19 41 =33682	Log. Ratio	0,22504
Ela. T. 1 0 0	Diff. N. S. 4083	Its Com. Log.	3,61098
½ El. T. 0 30 0	Its Log. from Col. half Elap. Time is		0,88430
1 1 0	In Col. of Mid. Time corresponding to		4,72032
Tr. Tim. 0 31 0	From Noon, its Log. from Col. of Riſ.		2,96067
T. p. W. 0 43 0		Log. Ratio Sub.	0,22504
W. ſlow 0 12 0	544 N. Num. of		2.73563
	33682 N. S. greateſt Alt.		
0 90° 0′			
0 20 1	34226 N. S. of Sun's Mer. Alt. 20° 1′.		
Zen. Diſt. 69 59			
Decl. 20 0 S.			
Lat. 49 59 N.			

But as this Latitude differs 41 Miles from that by Account, it will be proper to repeat the Operation, uſing the Lat. laſt found inſtead of the Lat. by Account.

	H. M. S.	Lat. 49° 56′	0,19178
½ Elapſed Time	0 30 0	Decl. 20 0	0,02701
	1 0 0		
		Log. Ratio	0,21879
True Time	0 30 0		3,61098
Time per Watch	0 43 0		0,88430
		H. M.	
Watch ſlow	0 13 0	In Col. Mid. T. 1 0	4,71307
True Time	0 30 0	Its Log. in Col. of Riſing is	2,93223
		Log. Ratio	0,21879
		517 Nat. Num. of	2,71344
		33682 Nat. S. gr. Alt.	
Nat. S. Sun's Mer. Alt.		34199=20° 0′	
	Zen. Diſt.	70 0	
	Decl.	20 0 S.	
	The Lat.	50 0 North.	

The Latitude laſt found, differing only one Mile from that uſed in the Operation, may be depended on as the Latitude. Hence it is plain, that the Operation is repeated with very little additional Trouble, but few Alterations being neceſſary.

EXAMPLE IV.

Being at Sea in the Latitude of 60° 0′ North by Account, when the Sun was on the Equator, and conſequently had no Declination, at 1 H. 0 M. P. M. per Watch, his Altitude was 28° 53′, and at 3 H. 0 M. P. M. per Watch, it was 20° 42.′ Required the true Lat.

Times						
					Lat. 60° 0′	=0,30103
	H.	M.	S.	Alt. N. S.	Dec. 0 0	=0,00000
	1	0	0	28 53=48303		
	3	0	0	20 42=35347	Log. Ratio	0,30103
Elap. T.	2	0	0	12956	Its Log.	4,11244
Elap. T.	1	0	0		Its Log. in Col. of ½ Elap. Time	0,58700
	2	0	0		Its Log. in Col. of Mid. T.	5,00050
T. fr. N.	1	0	0		Its Log. from Col. of Riſing	3,53243
Do. per W.	1	0	0		Log. Ratio	0,30103
				1704		3,23140
				48303		

90

Nat. S. Sun's Mer. Alt. 50007=30° 0′ Sun's Meridian Alt.

66 0 Latitude

The Latitude by Computation, coming the ſame with the Latitude by Account, ſhews that the Latitude by Account was right. From the foregoing Examples it is plain, that the Operation is the ſame, whether the Sun hath North or South Declination. And it will be the ſame whether the Ship is in a North or South Latitude. It is alſo clear, that when the Sun has no Declination, the Secant of the Latitude is the Log. Ratio.

EXAMPLE V.

July 5th, 1786, wanting to go through the N. Channel among the Maldives, and by Account being in Latitude 7° 40′N. at 7 H. 25 M. 40 S. A. M. the true Altitude of the Sun's Centre was 22° 30′, and at 10 H. 31 M. 48 S. A. M, it was found 63° 40′. Required the Ship's true Latitude?

H. M. S. Alt. Nat. S. Lat. by Ac. 7° 40′ 0,00390
Times 10 31 48 63° 40′ 89623 D. July 5. 22 47 0,03528
7 25 40 22 30 38268
Log. Ratio 0,03918
Elap. T. 3 6 8 51355 Its Log. 4,71058

½ El. T. 1 33 04 Its Log. in Col of ½ Elap. Time is 0,40368
3 1 30 H. M. S.
3 1 30 5,15344

True T. 1 28 26 Its Log. in Col. of Rising is 3,86709
T. p. W. 1 28 12 Log. Ratio 0,03918

Wat. f. 0 0 14 6728 Nat. Num. 3,82781
90 00 89623 Nat. S. gr. Alt.
Mer. Alt. 74 29
96351 N. S. Sun's Mer. Alt. = 74° 29′.
Zen. Dist. 15 31
Decl. 22 47

Lat. in 7 16 North.

N. B. As the Tables are only calculated to 30 Seconds, the Log. for any intermediate Seconds is found by taking the Difference between the Log. next greater and next leſs, and ſaying, as 30 Seconds is to that Difference, ſo is the given Seconds to the Difference of the Logarithms; or, if it be any even Part, take ſuch a Part of the Difference, and apply it to the next leſs Logarithm; but in theſe Operations a few Seconds are not regarded.

SECOND OPERATION.

Lat. 7° 16′ 0,00350
Dec. 22 47 0,03528

Log. Ratio 0,03878
H. M. S. 4,71058
3 1 30 0,40368
H. M. S.
1 33 0 3 1 30 5,15304

True Time 1 28 30 3,86700
N. S. gr. Alt. 89623 Log. Ratio 0,03878

6733 N. Nu. Log. 3,82822
N. S. Sun's M. Alt. 96356 = 74 29. Hence the Lat. in is 7° 16′ N.

The

The Latitude laſt found, agreeing with that uſed in the Operation, it may be taken as the True Latitude; and the Operation is repeated with very little additional Trouble, but few Alterations being neceſſary. Hence it is plain, that if you are miſtaken in the Latitude by Account, yet by repeating the Work two or three Times, making Uſe of the Latitude laſt found in the next Operation, it will at laſt diſcover itſelf to be true, by being equal to the laſt Suppoſition, which evidently ſhews the Excellency of theſe new Tables.

EXAMPLE VII.

Ship under way, between the Obſervations, A. M. on the 29th December, 1783, in Latitude by Dead Reckoning of 44° N. not having regulated my Watch by Aſtronomical Obſervations, I had a good View of the Sun, and allowing for Dip of Horizon, Refraction, &c. found the true Altitude of his Centre to be 20° 58′. At an Hour and a Half afterwards his Altitude of Centre was 22° 29′, the Ship going 9 Knots an Hour on a W. S. W. Courſe; the Sun bearing by the Compaſs S. by E. when the firſt Altitude was taken. Required the true Time of the greateſt Altitude and true Latitude of the Place at Noon?

N. B. At the Rate of 9 Knots an Hour the Diſtance run between the Obſervations will be 13 ½, which by Tables of Latitude and Departure gives 12 Miles of Weſting, or one Mile Longitude, and 5 of Southing; and 5 Miles Southing, bearing with the Sun, gives about 4′ to be added to the Difference of Latitude, Hence the Operation will be thus:

Times. Alt. N. S. Lat. by D. R. 44° N. 0,14307
H. M. S. 1ſt 20° 58′ Declin. 23° 14′ S. 0,03673
1 30 00 4 Diff. Lat.

0 1 0 2d 21 2 35891 Log. Ratio = 0,17980
22 29 38241
½) 1 31 00
2351 Its Log. 3,37125
From 0 45 30 Its Log. in Col. half elapſed Time is 0,70503

Sub. 0 20 30 Tr. Ti. found in Col. of M. Ti. anſw. to 4,25608

Rem. 0 25 00 D°. from N. its Log. in Col. of Log. riſ. is 2,77505
From 12 0 0 Sub. Log. Ratio 0,17980
Nat. N.
11 35 00 T. when greateſt Alt. was taken 393 = 2,59525
11 30 00 Time per Watch
N. Si. of gr. Alt. 38241 90° 00′
00 5 00 W. to ſlow.
Nat. Sine of Sun's Mer. Alt. 39634 = 22° 44′

N. B. Had a good Obſervation at Noon, which agreed exactly with that by the double Altitudes.

Sun's Zen. Diſt. 67 16 S.
Sun's Dec. S. Sub. 23 14

Lat. in at Noon 44 2 N.

A TABLE of the SUN'S RIGHT ASCENSION.

Days	Jan.	Feb.	Marc.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Days
	South	South	South	North	North	North	North	North	North	South	South	South	
	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	
1	18 48	21 0	22 49	0 43	2 34	4 36	6 41	8 46	10 42	12 30	14 26	16 30	1
2	18 52	21 4	22 53	0 46	2 38	4 41	6 45	8 49	10 45	12 33	14 30	16 34	2
3	18 57	21 8	22 57	0 50	2 41	4 45	6 49	8 53	10 49	12 37	14 34	16 39	3
4	19 1	21 12	23 1	0 53	2 45	4 49	6 53	8 57	10 52	12 41	14 38	16 43	4
5	19 6	21 16	23 4	0 57	2 49	4 53	6 57	9 1	10 56	12 44	14 42	16 47	5
6	19 10	21 20	23 8	1 1	2 53	4 56	7 1	9 5	11 0	12 48	14 46	16 52	6
7	19 14	21 24	23 11	1 4	2 57	5 1	7 5	9 9	11 3	12 52	14 50	16 56	7
8	19 19	21 28	23 15	1 8	3 1	5 5	7 10	9 12	11 7	12 55	14 54	17 0	8
9	19 23	21 32	23 19	1 12	3 5	5 9	7 14	9 16	11 11	12 59	14 58	17 5	9
10	19 27	21 36	23 22	1 15	3 8	5 13	7 18	9 20	11 14	13 3	15 2	17 9	10
11	19 32	21 40	23 26	1 19	3 12	5 18	7 22	9 24	11 18	13 6	15 6	17 14	11
12	19 36	21 44	23 30	1 23	3 16	5 22	7 26	9 28	11 21	13 10	15 10	17 18	12
13	19 40	21 48	23 33	1 26	3 20	5 26	7 30	9 31	11 25	13 14	15 14	17 23	13
14	19 45	21 52	23 37	1 30	3 24	5 30	7 34	9 35	11 28	13 17	15 18	17 27	14
15	19 49	21 56	23 41	1 34	3 28	5 34	7 38	9 39	11 32	13 21	15 22	17 31	15
16	19 53	22 0	23 44	1 37	3 32	5 38	7 42	9 43	11 36	13 25	15 26	17 36	16
17	19 58	22 4	23 48	1 41	3 36	5 43	7 46	9 46	11 39	13 29	15 31	17 40	17
18	20 2	22 7	23 52	1 45	3 40	5 47	7 50	9 50	11 43	13 32	15 35	17 45	18
19	20 6	22 11	23 55	1 49	3 44	5 51	7 54	9 54	11 46	13 36	15 39	17 49	19
20	20 10	22 15	23 59	1 52	3 48	5 55	7 58	9 58	11 50	13 40	15 43	17 54	20
21	20 14	22 19	0 3	1 56	3 52	5 59	8 2	10 1	11 54	13 44	15 47	17 58	21
22	20 19	22 23	0 6	2 0	3 56	6 3	8 6	10 5	11 57	13 47	15 52	18 2	22
23	20 23	22 26	0 10	2 3	4 0	6 7	8 10	10 9	12 1	13 51	15 56	18 7	23
24	20 27	22 30	0 13	2 7	4 4	6 12	8 14	10 12	12 4	13 55	16 0	18 11	24
25	20 31	22 34	0 17	2 11	4 8	6 16	8 18	10 16	12 8	13 59	16 4	18 16	25
26	20 35	22 38	0 21	2 15	4 12	6 20	8 22	10 20	12 12	14 3	16 9	18 20	26
27	20 40	22 42	0 24	2 19	4 16	6 24	8 26	10 23	12 15	14 7	16 13	18 25	27
28	20 44	22 45	0 28	2 22	4 20	6 28	8 30	10 27	12 19	14 10	16 17	18 29	28
29	20 48		0 32	2 26	4 24	6 32	8 34	10 31	12 22	14 14	16 21	18 34	29
30	20 52		0 35	2 30	4 28	6 37	8 38	10 34	12 26	14 18	16 26	18 38	30
31	20 56		0 39		4 32		8 42	10 38		14 22		18 42	31

This Table is ſufficiently exact for finding, when any Star comes to the Meridian, in order to obtain the Latitude; but in all Calculations for determining the Longitude by Celeſtial Obſervations, the Sun's Right Aſcenſion and Declination muſt be taken out of the Nautical Almanac, as they are there calculated to a greater Degree of Accuracy.

A TABLE of the Right Aſcenſion and Declination of ſome of the principal fixed Stars adapted to the Year 1779, with their Annual Variation.

Names of the Stars.	Right Aſcen. in Time.				Ann. Vari.		Declination.				Ann. Vari.	
	H.	M.	S.	T.	S.	T.	°	′	″		S.	T.
Arietis	1	54	45	2	3	337	12	24	34	2 N	17	64+
Aldebaran, South Eye of the Bull	4	23	15	5	3	427	16	2	57	9 N	8	32+
Pollux, Southern Twin	7	30	17	4	3	751	28	32	36	5 N	7	72—
Regulus, the Lion's Heart	9	55	17	8	3	24	13	2	23	6 N	17	17—
Spica Virginis	13	13	34	8	3	151	10	0	4	6 S.	18	97+
Antares, the Scorpion's Heart	16	15	53	6	3	661	25	55	22	9 S.	8	89+
Altair in Aquila, the Eagle	19	39	56	6	2	902	8	17	44	6 N	8	40+
Capricorn	20	5	6	6	3	346	13	12	55	4 S.	10	40—
Fomalhaut, in the Mouth of Southern Fiſh	22	44	3	2	3	378	30	47	13	6 S.	18	97—
Pegaſi Markab	22	53	46	1	2	983	14	1	10	8 N	19	20+
Pegaſi Algenib, in the Wing	0	1	52	8	3	08	13	57	7	8 N	20	4+
Ceti	2	50	45	0	3	128	3	12	41	7 N	14	80+
Capella, in Left Shoulder of Auriga	5	0	21	1	4	402	45	44	42	3 N	5	28+
Rigil, in the Foot of Orion	5	2	46	2	2	887	8	28	16	1 S.	4	94—
Taurus	5	12	20	4	3	786	28	24	8	5 N	4	24+
Orion, in the Eaſt Shoulder	5	43	12	8	3	250	7	20	46	6 N	1	56+
Sirius, in Great Dog's Mouth	6	35	25	5	2	690	16	25	5	3 S.	3	10+
Caſtor, in Head Southern Twin	7	18	55	6	3	876	32	21	14	8 N	6	80—
Procyon, in the Little Dog	7	26	27	7	3	205	5	47	3	4 N	7	42—
Arcturus in Bootes	14	4	29	4	2	821	20	21	5	9 N	17	16—
Sagitarius	18	7	54	9	3	930	34	27	55	9 S.	0	72—
Schedar in the Breaſt of Caſſiopeia	0	28	3	2	3	300	55	19	18	N	20	+
Pole Star in the Tail of the Little Bear	0	47	35	0	1	500	88	7	30	N	19	+
Achernar, in the River Eridanus	1	28	20	9	2	26	56	21	56	S.	18	+
Almaack, in the Foot of Andromeda	1	50	24	4	3	61	41	15	38	N	18	+
Algol in the Head of Meduſa	2	54	11	3	3	84	40	5	24	N	15	+
Pleiades, or Seven Stars in the Neck of the Bull	3	34	21	2	3	54	23	24	24	N	12	+
Canobus, in Poop of Ship Argo	6	19	2	3	1	34	52	34	55	S.	2	+
Cor Hydræ, or Alphard	9	16	43	8	1	96	7	42	30	S.	15	+
Dubbe, the North Pointer in the Great Bear	10	47	58	4	3	89	62	56	22	N	19	—
South Star of Croſiers, Foot of the Croſs	12	14	29	8	3	22	61	52	27	S.	10	+
The Weſt Foot of Centaur	14	24	57	6	4	41	59	54	59	S.	16	+
The Head of Andromeda	23	57	2	4	3	6	27	52	13	N	20	+
Lyra, the Bright Star in the Harp	18	29	27	0	2	0	38	35	13	N	2	+
Eridani	1	29	1	9	2	26	58	32	22	S.	18	+
Coronæ	15	24	41	0	2	0	27	28	17	N	12	—
Mirach, in Andromeda's Girdle	0	57	23	1	3	29	34	26	37	N	19	+
Bright Star in Oars of Ship Argo	9	10	43	0	0	75	68	48	53	S.	15	+
Southern Scale of Libra	14	38	50	2	3	30	15	7	39	S.	16	+
Northern Scale of Libra	15	5	17	2	3	30	8	33	59	S.	14	+
The Bright Star in Perſeus	3	8	38	7	4	19	49	3	26	N	14	+

The Firſt Ten Stars are uſed in the Nautical Almanac for determining the Longitude deduced from Doctor Bradley's Obſervations. All the Stars Right Aſcenſions are here reduced into Time, it being omitted in the Ephemeris for 1767.

It is obvious, that by the Sun's Annual Motion, he is perpetually changing his Declination and Right Aſcenſion, which is ſet down in the preceding Table for the Noon of every Day at London; and may be reduced to any other Time or Meredian, as has been already ſhewn in finding the Longitude.

By the Preceſſion of the Equinoxes, the fixed Stars are continually altering their Longitudes, Right Aſcenſions, and Declinations, the Alteration in Longitude is about 50 Seconds every Year; the Alteration in Right Aſcenſion and Declination of ſome of the principal fixed Stars are ſet down in the preceding Table for 1779, and their Annual Variation, which being applied to the Right Aſcenſion and Declination in the Table, by Addition or Subtraction, gives the Right Aſcenſion and Declination for any ſucceeding Years.

The Right Aſcenſion of the Sun, Moon, or Stars, is the Number of Degrees of the Equinoctial that comes to the Meridian with them, counted from the firſt Point of Aries.

The Uſe of the Tables of the Right Aſcenſion of the Sun and Stars is to find the Time when any Star culminates, or is upon the Meridian on a given Day.

RULE.

Look for the Right Aſcenſion of the Sun and Star in the preceding Table, and ſubtract, the Sun's Right Aſcenſion from the Star's; but if the Sun's Right Aſcenſion be greateſt, add 24 Hours to the Star's Right Aſcenſion, and then ſubbtract the Sun's from it, the Remainder will be the Time of the Star's coming to the Meridian.

When the Sun's Right Aſcenſion is leaſt, the Star comes to the Meridian in the Afternoon, but before Noon when the Sun's is gteateſt.

EXAMPLE I.

At what Time will the Star Arcturus be on the Meridian of London, Dec. 1?

	H.	M.
Arcturus's Right Aſcenſion —	14	4
	24	0
	38	4
Sun's Right Aſcenſion	16	30
After Midnight —	21	34
	12	0
Morning — —	9	34

That is, the Star Arcturus will be upon the Meridian of London 34 Minutes after Nine o'Clock in the Morning.

EXAMPLE II.

At what Time will the Star Virgin's Spike be on the Meridian of London, September 1?

	H	M.
Spica Virginis' Right Aſcenſion	13	13
Sun's Right Aſcenſion —	10	42
The Star culminates Afternoon	2	31

So the Star Virginis' Spike comes to the Meridian at London 31 Minutes after Two in the Afternoon.

To find what Star will come upon the Meridian at any given Time.

RULE.

Add the Time from Noon to the Right Aſcenſion of the Sun, the Sum will be the Right Aſcenſion of the Star required to be known; with which enter the Table of the Star's Right Aſcenon, and find what Star's Right Aſcenſion agrees with, or comes the neareſt to it, and that is the Star required.

EXAMPLE I.

I would know what Star would be on the Meridian of London about Ten at Night, January 25th?

	H.	M.
Sun's Right Aſcen. Jan. 25, at Noon	20	31
And for 10 Hours more	0	2
Given Time 10 Hours, P.M.	10	0
	30	33
Sub.	24	0
Nearly anſwers to Sirius	6	33

EXAMPLE II.

What Star will be upon the Meridian of London 20 Minutes paſt Four in the Morning, May 10?

	H.	M.
Sun's Right Aſcen. May 9 at Noon	3	5
And for 16 Hours more —	0	3
Given Time 16h. 30m. P.M.	16	30
Right Aſcenſion of Mid. Heaven	19	38
Anſwers nearly to Aquila		

A TABLE of the SUN's DECLINATION

For the YEARS 1783, 1787, 1791, 1795, 1899, 1803, 1807.

Being the Third after Leap-Year.

Days	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	South	South	South	North	North	North	North	North	North	South	South	South
1	23. 0	17. 3	7. 30	4. 37	15. 8	22. 5	23. 8	18. 2	8. 16	3. 14	14. 30	21. 52
2	22. 55	16. 45	7. 7	5. 0	15. 26	22. 13	23. 4	17. 46	7. 54	3. 38	14. 50	22. 1
3	22. 49	16. 28	6. 44	5. 23	15. 43	22. 21	22. 59	17. 31	7. 32	4. 1	15. 8	22. 10
4	22. 43	16. 10	6. 21	5. 46	16. 1	22. 28	22. 54	17. 15	7. 10	4. 24	15. 27	22. 18
5	22. 36	15. 51	5. 58	6. 8	16. 18	22. 35	22. 49	16. 59	6. 47	4. 48	15. 45	22. 26
6	22. 29	15. 33	5. 35	6. 31	16. 35	22. 41	22. 43	16. 42	6. 25	5. 11	16. 4	22. 33
7	22. 22	15. 14	5. 12	6. 54	16. 51	22. 47	22. 37	16. 26	6. 2	5. 34	16. 21	22. 40
8	22. 14	14. 55	4. 48	7. 16	17. 8	22. 53	22. 30	16. 9	5. 40	5. 57	16. 39	22. 46
9	22. 5	14. 36	4. 25	7. 39	17. 24	22. 58	22. 23	15. 51	5. 17	6. 20	16. 56	22. 52
10	21. 56	14. 17	4. 1	8. 1	17. 40	23. 3	22. 16	15. 34	4. 54	6. 42	17. 13	22. 58
11	21. 47	13. 57	3. 38	8. 23	17. 55	23. 7	22. 8	15. 16	4. 32	7. 5	17. 30	23. 3
12	21. 37	13. 37	3. 14	8. 45	18. 11	23. 11	22. 0	14. 58	4. 8	7. 28	17. 46	23. 7
13	21. 27	13. 17	2. 51	9. 7	18. 26	23. 15	21. 51	14. 40	3. 46	7. 50	18. 2	23. 11
14	21. 17	12. 57	2. 27	9. 28	18. 40	23. 18	21. 42	14. 22	3. 23	8. 13	18. 18	23. 15
15	21. 6	12. 36	2. 3	9. 50	18. 54	23. 20	21. 33	14. 3	3. 0	8. 35	18. 34	23. 19
16	20. 54	12. 15	1. 40	10. 11	19. 8	23. 23	21. 23	13. 44	2. 36	8. 57	18. 49	23. 21
17	20. 43	11. 54	1. 16	10. 32	19. 22	23. 25	21. 13	13. 25	2. 13	9. 19	19. 4	23. 24
18	20. 30	11. 33	0. 52	10. 53	19. 35	23. 26	21. 3	13. 6	1. 50	9. 41	19. 18	23. 25
19	20. 18	11. 12	0. 29	11. 14	19. 48	23. 27	20. 52	12. 46	1. 27	10. 3	19. 32	23. 27
20	20. 5	10. 50	0. 5	11. 34	20. 1	23. 28	20. 41	12. 27	1. 3	10. 25	19. 46	23. 28
21	19. 52	10. 29	0. 19N	11. 55	20. 13	23. 28	20. 29	12. 7	0. 40	10. 46	19. 59	23. 28
22	19. 38	10. 7	0. 42	12. 15	20. 25	23. 28	20. 18	11. 46	0. 16	11. 7	20. 12	23. 28
23	19. 24	9. 45	1. 6	12. 35	20. 37	23. 27	20. 6	11. 26	So. 7	11. 29	20. 25	23. 28
24	19. 10	9. 23	1. 30	12. 55	20. 48	23. 27	19. 53	11. 6	0. 31	11. 50	20. 37	23. 27
25	18. 55	9. 1	1. 53	13. 15	20. 59	23. 25	19. 40	10. 45	0. 54	12. 10	20. 49	23. 25
26	18. 40	8. 38	2. 17	13. 34	21. 10	23. 23	19. 27	10. 24	1. 17	12. 31	21. 1	23. 23
27	18. 25	8. 16	2. 40	13. 53	21. 20	23. 21	19. 14	10. 3	1. 41	12. 51	21. 12	23. 21
28	18. 9	7. 53	3. 14	14. 12	21. 30	23. 18	19. 0	9. 42	2. 4	13. 12	21. 22	23. 18
29	17. 53		3. 27	14. 31	21. 39	23. 15	18. 46	9. 20	2. 28	13. 32	21. 33	23. 14
30	17. 36		3. 50	14. 49	21. 48	23. 12	18. 31	8. 59	2. 51	13. 52	21. 43	23. 11
31	17. 19		4. 14		21. 57		18. 17	8. 37		14. 11		23. [illegible]

A TABLE of the SUN'S DECLINATION

For the YEARS 1784, 1788, 1792, 1796, 1800, 1804, 1808.

Each being Leap-Year.

Days.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	South	South	South	North	North	North	North	North	North	South	South	South
1	23. 2	17. 7	7.13	4.54	15.21	22.11	23. 5	17.50	7.59	3.32	14.45	21.59
2	22.56	16.49	6.50	5.17	15.39	22.19	23. 0	17.35	7.37	3.55	15. 4	22. 7
3	22.51	16.32	6.27	5.40	15.57	22.26	22.55	17.19	7.15	4.19	15.22	22.16
4	22.45	16.14	6. 4	6. 3	16.14	22.33	22.50	17. 3	6.53	4.42	15.41	22.24
5	22.38	15.56	5.41	6.26	16.31	22.40	22.44	16.46	6.30	5. 5	15.59	22.31
6	22.31	15.38	5.17	6.48	16.48	22.46	22.38	16.30	6. 8	5.28	16.17	22.38
7	22.24	15.19	4.54	7.11	17. 4	22.51	22.32	16.13	5.45	5.51	16.35	22.45
8	22.16	15. 0	4.31	7.33	17.20	22.57	22.25	15.56	5.23	6.14	16.52	22.51
9	22. 7	14.41	4. 7	7.55	17.36	23. 2	22.17	15.38	5.	6.37	17. 9	22.56
10	21.59	14.22	3.44	8.17	17.52	23. 6	22. 9	15.21	4.37	7. 0	17.26	23. 2
11	21.49	14. 2	3.20	8.39	18. 7	23.10	22. 1	15. 3	4.14	7.22	17.42	23. 6
12	21.40	13.42	2.56	9. 1	18.22	23.14	21.53	14.45	3.51	7.45	17.59	23.11
13	21.30	13.22	2.33	9.23	18.37	23.17	21.44	14.26	3.28	8. 7	18.14	23.14
14	21.19	13. 2	2. 9	9.44	18.51	23.20	21.35	14. 8	3. 5	8.30	18.30	23.18
15	21. 8	12.41	1.45	10. 6	19. 5	23.22	21.25	13.49	2.42	8.52	18.45	23.21
16	20.57	12.20	1.22	10.27	19.19	23.24	21.15	13.30	2.19	9.14	19. 0	23.23
17	20.46	11.59	0.58	10.48	19.32	23.26	21. 5	13.10	1.55	9.36	19.15	23.25
18	20.33	11.38	0.34	11. 9	19.45	23.27	20.54	12.51	1.32	9.57	19.29	23.27
19	20.21	11.17	0.11	11.30	19.58	23.28	20.43	12.31	1. 9	10.19	19.43	23.28
20	20. 8	10.56	0.13	11.50	20.11	23.28	20.32	12.11	0.45	10.41	19.56	23.28
21	19.55	10.34	0.37	11.10	20.23	23.28	20.20	11.51	0.22	11. 2	20. 9	23.28
22	19.41	10.12	1. 0	12.30	20.34	23.28	20. 8	11.31	0. 1S	11.24	20.22	23.28
23	19.27	9.50	1.24	12.50	20.46	23.27	19.56	11.10	0.25	11.45	20.34	23.27
24	19.13	9.28	1.48	13.10	20.57	23.25	19.43	10.50	0.48	12. 5	20.46	23.25
25	18.58	9. 6	2.11	13.29	21. 7	23.24	19.30	10.29	1.12	12.26	20.58	23.24
26	18.43	8.44	2.35	13.49	21.18	23.22	19.17	10. 8	1.35	12.47	21. 9	23.21
27	18.28	8.21	2.58	14. 8	21.27	23.19	19. 3	9.47	1.59	13. 7	21.20	23.19
28	18.12	7.58	3.21	14.26	21.37	23.16	18.49	9.26	2.22	13.27	21.30	23.15
29	17.56	7.36	3.45	14.45	21.46	23.13	18.35	9. 4	2.45	13.47	21.40	23.12
30	17.40		4. 8	15. 3	21.55	23. 9	18.20	8.43	3. 9	14. 6	21.50	23. 7
31	17.23		4.31		22. 3		18. 5	8.21		14.26		23. 3

A TABLE of the SUN's DECLINATION For the YEARS 1785, 1789, 1793, 1797, 1801, 1805, 1809.

Each being first after Leap-Year.

Days	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	South	South	South	North	North	North	North	North	North	South	South	South
1	22.58	16.54	7.18	4.49	15.17	22.9	23.6	17.54	8.4	3.27	14.40	21.57
2	22.52	16.36	6.56	5.12	15.35	22.17	23.1	17.38	7.42	3.40	14.59	22.6
3	22.46	16.18	6.33	5.35	15.52	22.25	22.57	17.23	7.21	4.13	15.18	22.14
4	22.40	16.0	6.9	5.57	16.10	22.32	22.51	17.7	6.58	4.36	15.37	22.22
5	22.33	15.42	5.46	6.20	16.27	22.38	22.46	16.50	6.36	5.0	15.55	22.29
6	22.26	15.23	5.23	6.43	16.44	22.44	22.40	16.34	6.13	5.23	16.13	22.37
7	22.18	15.5	5.0	7.5	17.0	22.50	22.33	16.17	5.51	5.46	16.31	22.43
8	22.9	14.46	4.36	7.28	17.16	22.55	22.26	16.0	5.28	6.9	16.48	22.49
9	22.1	14.26	4.13	7.50	17.32	23.0	22.19	15.42	5.5	6.31	17.5	22.55
10	21.52	14.7	3.40	8.12	17.48	23.5	22.11	15.25	4.43	6.54	17.22	23.0
11	21.42	13.47	3.26	8.34	18.3	23.9	22.3	15.7	4.20	7.17	17.38	23.5
12	21.32	13.27	3.2	8.56	18.19	23.13	21.55	14.49	3.57	7.40	17.55	23.10
13	21.22	13.6	2.38	9.18	18.33	23.16	21.46	14.31	3.34	8.2	18.11	23.14
14	21.11	12.46	2.15	9.39	18.48	23.19	21.37	14.12	3.11	8.24	18.26	23.17
15	21.0	12.26	1.51	10.1	19.2	23.22	21.28	13.53	2.47	8.47	18.42	23.20
16	20.48	12.4	1.27	10.22	19.16	23.24	21.18	13.34	2.24	9.9	18.56	23.23
17	20.36	11.43	1.4	10.43	19.29	23.26	21.8	13.15	2.1	9.31	19.11	23.25
18	20.24	11.22	0.40	11.4	19.42	23.27	20.57	12.56	1.38	9.52	19.25	23.26
19	20.11	11.1	0.16	11.25	19.55	23.28	20.46	12.36	1.14	10.14	19.39	23.27
20	19.58	10.39	0.7 N	11.45	20.8	23.28	20.35	12.16	0.51	10.36	19.53	23.28
21	19.45	10.17	0.31	12.5	20.20	23.28	20.23	11.56	0.28	10.57	20.6	23.28
22	19.31	9.56	0.55	12.26	20.31	23.28	20.11	11.36	0.4	11.18	20.19	23.28
23	19.17	9.34	1.18	12.46	20.43	23.27	19.59	11.15	0.19 S.	11.40	20.31	23.27
24	19.2	9.11	1.42	13.5	20.54	23.26	19.46	10.55	0.43	12.0	20.43	23.26
25	18.47	8.49	2.5	13.25	21.5	23.24	19.33	10.34	1.6	12.21	20.55	23.24
26	18.32	8.27	2.29	13.44	21.15	23.22	19.20	10.13	1.30	12.42	21.6	23.22
27	18.16	8.4	2.52	14.3	21.25	23.20	19.6	9.52	1.53	13.2	21.17	23.19
28	18.0	7.41	3.16	14.22	21.35	23.17	18.53	9.31	2.16	13.22	21.28	23.16
29	17.44		3.39	14.41	21.44	23.14	18.38	9.9	2.40	13.42	21.38	23.13
30	17.28		4.2	14.59	21.53	23.10	18.24	8.48	3.3	14.2	21.47	23.9
31	17.11		4.26		22.1		18.9	8.26		14.21		23.4

A TABLE of the SUN's DECLINATION

For the YEARS 1786, 1790, 1794, 1798, 1802, 1806, 1810.

Each being ſecond after Leap-Year.

Days	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	South	South	South	North	North	North	North	North	North	South	South	South
1	22.59	16.58	7.24	4.43	15.13	22. 8	23. 7	17.57	8. 9	3.21	14.36	21.54
2	22.53	16.40	7. 1	5. 6	15.30	22.15	23. 2	17.42	7.48	3.44	14.55	22. 3
3	22.48	16.23	6.38	5.29	15.48	22.23	22.58	17.26	7.26	4. 8	15.14	22.12
4	22.41	16. 5	6.15	5.52	16. 6	22.30	22.53	17.10	7. 3	4.31	15.32	22.20
5	22.34	15.46	5.52	6.15	16.23	22.36	22.47	16.54	6.41	4.54	15.50	22.28
6	22.27	15.28	5.29	6.37	16.40	22.43	22.41	16.38	6.19	5.17	16. 8	22.35
7	22.20	15. 9	5. 5	7. 0	16.56	22.49	22.35	16.21	5.56	5.40	16.26	22.42
8	22.11	14.50	4.41	7.22	17.12	22.54	22.28	16. 4	5.34	6. 3	16.44	22.48
9	22. 3	14.31	4.18	7.45	17.28	22.59	22.21	15.47	5.11	6.26	17. 1	22.54
10	22.54	14.11	3.55	8. 7	17.44	23. 4	22.13	15.29	4.48	6.49	17.18	22.59
11	21.44	13.52	3.31	8.29	18. 0	23. 8	22. 5	15.11	4.25	7.11	17.34	23. 4
12	21.35	13.32	3. 8	8.51	18.15	23.12	21.57	14.53	4. 2	7.34	17.51	23. 9
13	21.24	13.12	2.44	9.12	18.30	23.15	21.48	14.35	3.39	7.56	18. 7	23.13
14	21.14	12.51	2.21	9.34	18.44	23.18	21.39	14.16	3.16	8.19	18.22	23.16
15	21. 3	12.30	1.57	9.55	18.58	23.21	21.30	13.58	2.53	8.41	18.38	23.19
16	20.51	12.10	1.33	10.17	19.12	23.23	21.20	13.39	2.30	9. 3	18.53	23.22
17	20.39	11.49	1.10	10.38	19.26	23.25	21.10	13.20	2. 7	9.25	19. 8	23.24
18	20.27	11.27	0.46	10.59	19.30	23.26	21. 0	13. 0	1.43	9.47	19.22	23.26
19	20.14	11. 6	0.22	11.20	19.52	23.27	20.49	12.41	1.20	10. 9	19.36	23.27
20	20. 1	10.45	0. 1 N	11.40	20. 4	23.28	20.38	12.21	0.57	10.31	19.49	23.28
21	19.48	10.23	0.25	12. 0	20.17	23.28	20.26	12. 1	0.33	10.52	20. 3	23.28
22	19.34	10. 1	0.49	12.21	20.29	23.28	20.14	11.41	0.10	11.13	20.16	23.28
23	19.20	9.39	1.12	12.41	20.40	23.27	20. 2	11.20	0.14S	11.34	20.28	23.27
24	19. 6	9.17	1.36	13. 0	20.51	23.26	19.49	11. 0	0.37	11.55	20.40	23.26
25	18.51	8.54	2. 0	13.20	21. 2	23.25	19.36	10.39	1. 1	12.16	20.52	23.24
26	18.36	8.32	2.23	13.39	21.13	23.23	19.23	10.18	1.24	12.37	21. 4	23.22
27	18.20	8. 9	2.47	13.58	21.23	23.20	19.10	9.57	1.47	12.57	21.15	23.20
28	18. 4	7.47	3.10	14.17	21.32	23.18	18.56	9.36	2.11	13.17	21.25	23.17
29	17.48		3.33	14.36	21.42	23.14	18.42	9.14	2.34	13.37	21.35	23.13
30	17.32		3.57	14.54	21.51	23.11	18.27	8.53	2.58	13.57	21.45	23. 9
31	17.15		4.20		21.59		18.12	8.31		14.16		23. 5

A TABLE of the VARIATION of the SUN's DECLINATION to every 10 Degrees of Longitude.

Daily Var.	DEGREES of LONGITUDE from the MERIDIAN of LONDON.																	
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
Min.	′	′	′	′	′	′	′	′	′	′	′	′	′	′	′	′	′	′
2	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
3	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
4	0	0	0	0	1	1	1	1	1	1	1	1	1	2	2	2	2	2
5	0	0	0	0	1	1	1	1	1	1	1	2	2	2	2	2	2	2
6	0	0	0	0	1	1	1	1	1	2	2	2	2	2	2	2	3	3
7	0	0	0	1	1	1	1	2	2	2	2	2	3	3	3	3	3	3
8	0	0	1	1	1	1	1	2	2	2	2	3	3	3	3	3	4	4
9	0	0	1	1	1	1	2	2	2	2	3	3	3	3	4	4	4	4
10	0	1	1	1	1	2	2	2	3	3	3	3	4	4	4	5	5	5
11	0	1	1	1	2	2	2	3	3	3	3	4	4	4	5	5	5	5
12	0	1	1	1	2	2	2	3	3	3	4	4	4	5	5	5	6	6
13	0	1	1	1	2	2	2	3	3	4	4	4	5	5	5	6	6	6
14	0	1	1	2	2	2	3	3	3	4	4	5	5	5	6	6	7	7
15	0	1	1	2	2	3	3	3	4	4	5	5	5	6	6	7	7	7
16	0	1	1	2	2	3	3	4	4	5	5	5	6	6	7	7	8	8
17	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7	7	8	8
18	1	1	2	2	3	3	4	4	5	5	6	6	7	7	7	8	9	9
19	1	1	2	2	3	3	4	4	5	5	6	6	7	7	7	8	9	9
20	1	1	2	2	3	3	4	4	5	6	6	7	7	8	8	9	9	10
21	1	1	2	2	3	4	4	5	5	6	6	7	8	8	9	9	10	10
22	1	1	2	2	3	4	4	5	6	6	7	7	8	9	9	10	10	11
23	1	1	2	3	3	4	4	5	6	6	7	8	8	9	10	10	11	11
24	1	1	2	3	3	4	5	5	6	7	7	8	9	9	10	11	11	12

To find the SUN's DECLINATION by the foregoing TABLES.

EACH Page of the foregoing Tables contains the Sun's Declination for the Years that it is marked with at the Top, and is divided into thirteen Columns; the firſt of which to the Left Hand ſhews the Day of the Month, and the other Twelve the Months of the Year, ſo that if it be required to find the Sun's Declination for any Day; ſuppoſe for Example, on the 21ſt of Auguſt, 1783; Firſt, I look for that Table that has 1783 at the Top of it, and then right againſt the 21ſt Day of the Month, and under Auguſt, I find 12,7, which ſhews the Sun's Declination to be 12 Degrees 7 Minutes North; according to the Title at the Top of the Column.

The Sun's Declination in theſe Tables being calculated for the Meridian of London, if you ſhould be conſiderably to the Eaſtward or to the Weſtward of London, it will cauſe ſome Alteration in it; to correct which, the

Table of the Variation of the Sun's Declination is to be uſed as follows:

Firſt, Look out the Declination for the given Day of the Month, and for the Day following it, and ſubtract the Leſſer from the Greater, the Remainder is the Daily Variation.

Second, Obſerve whether the Declination be increaſing or decreaſing, which you may know thus; If the Declination for the Day following the given Day be greateſt, then it is increaſing, but if it be leaſt, it is decreaſing.

Third, Look for the Daily Variation in the firſt Column of the Table, and ſee what Number ſtands right againſt it, and under the given Degrees of Longitude; which Number is to be uſed as follows:

If the Difference of Longitude be Eaſterly, and the Declination increaſing, it muſt be ſubtracted from the Declination found in the Tables for the given Day; but if the Declination be decreaſing, it muſt be added.

If the Difference of Longitude be Weſterly, and the Declination increaſing, it muſt be added; but if the Declination be decreaſing, it muſt be ſubtracted; the Sum in one Caſe, and the Remainder in the other, will be the Sun's Declination at Noon in the Longitude required.

Suppoſe on September 10, 1783, a Ship in Longitude 64 Degrees Weſt of London; what is the Sun's true Declination when on the Ship's Meridian?

	D. M.
Decll. at London Sept. 10, 1783,	4 54N.
Ditto at London Sept. 11,	4 32N.
Daily Variation of Declination	22 Miles

And becauſe the Declin. is decreaſing the Difference muſt be ſubtracted; therefore oppoſite to 22, and under 60 Degrees of Longitude ſtands 4 Minutes, which ſubtracted from 4° 54′, gives 4° 50′ the Declin, at the Ship.

Again, ſuppoſe in Longitude 80 Degrees Eaſt, on March 20th, 1787, what is the Sun's Declination? Here the Daily Difference is 24.

	D. M.
Sun's Decl. March 20	0 5 N.
Variation for 100 Degrees	5
Declination at Noon at Ship	0 0

Since the Declination is encreaſing, and the Longitude Eaſt, it muſt be ſubtracted, and the Remainder being nothing, ſhews that the Sun is upon the Equinoctial at the Ship's Meridian.

In like Manner may the Declination be fitted to any Meridian; but it ſometimes happens that the Declination is wanted when the Sun is not upon the Meridian; in ſuch Caſes it is beſt to find the Declination for the preceding and following Noons, and take the Difference, and then ſay, as 24 Hours is to that Difference, ſo is the Hours from Noon to a Fourth Number, which being added or ſubtracted, according as the Declination is increaſing or decreaſing, and the Time being in the Fore or Afternoon, gives the Sun's Declination for the given Time.

Suppoſe it were required to find the Sun's Declination on April 14, 1791, at 8 Hours 55 Minutes in the Morning?

Firſt I look in the Tables for the Sun's Declination, April 15, 1791, and find it to be 9° 50′; and then I look for it April 14, and find it to be 9° 28′; the Daily Difference is 22 Minutes: Then I ſay, as 24 Hours is to 22 Minutes, ſo is 20 H. 55 M. the Time elapſed ſince laſt Noon, to 19 Minutes, which added to 9° 28′, becauſe the Declination is encreaſing, gives 9° 47′ for the Declination at the given Time; but had the Declination been decreaſing, the 19 Minutes muſt have been ſubtracted.

In like Manner the Declination is found for any Hour of the Day, and under any Meridian, for you have nothing more to do, than to reduce the Difference of Longitude into Time, and add to or ſubtract it from the given Time, according as the Longitude is Eaſt or Weſt, and then find the Declination as above.

The Declinations have been carefully compared with the Nautical Almanac, and computed to the neareſt Minute, which is of ſufficient Exactneſs for determining the Latitude by Obſervation; but, in finding the Time, in order to determine the Longitude, the Declination muſt be taken out of the Nautical Almanac, it being there calculated to Minutes and Seconds.

Of Logarithmic Sines, Tangents, and Secants, to every Point and Quarter Point of the Compaſs.

Points.	Sines.	Co-ſines.	Tangent.	Co-tang.	Secants.	Co-ſecan.	Points.
0	0.00000	10.00000	0.00000	Infinite.	10.00000	Infinite.	8
0 ¼	8.69079	9.99947	8.69131	11.30867	10.00053	11.30921	7 ¾
0 ½	8.99130	9.99790	8.99340	11.00660	10.00210	11.00870	7 ½
0 ¾	9.16652	9.99527	9.17124	10.82875	10.00473	10.83348	7 ¼
1	9.29024	9.99157	9.29866	10.70134	10.00843	10.70976	7
1 ¼	9.38557	9.98679	9.39878	10.60121	10.01321	10.61443	6 ¾
1 ½	9.46282	9.98088	9.48194	10.51806	10.01912	10.53717	6 ½
1 ¾	9.52749	9.97385	9.55365	10.44639	10.02616	10.47251	6 ¼
2	9.58284	9.96562	9.61722	10.38278	10.03438	10.41710	6
2 ¼	9.63099	9.95616	9.67482	10.32518	10.04384	10.36901	5 ¼
2 ½	9.67339	9.94543	9.72796	10.27204	10.05457	10.32661	5 ½
2 ¾	9.71104	9.93335	9.77770	10.22230	10.06665	10.28898	5 ½
3	9.74474	9.91985	9.82489	10.17511	10.08015	10.25526	5 ¾
3 ¼	9.77503	9.90483	9.87020	10.12980	10.09517	10.22497	4 ¾
3 ½	9.80236	9.88819	9.91417	10.08583	10.11181	10.19764	4 ½
3 ¾	9.82708	9.86979	9.95729	10.04270	10.13021	10.17292	4
4	9.84948	9.84948	10.00000	10.00000	10.15052	10.15052	4
	Co-ſines.	Sines.	Co-tang.	Tangents	Co-ſecant	Secants.	

A Table of Logarithms from 1 to 120.

No.	Log.	o. o.	Log.	o. c.	Log.	No.	Log	No.	Log.	No.	Log.
1	0.00000	21	1.32222	41	1.61278	61	1.78533	81	1.90848	101	2.00432
2	0.30103	22	34242	42	62325	62	79239	82	91381	102	00860
3	0.47712	23	36173	43	63347	63	79934	83	91908	103	01284
4	0.60206	24	38021	44	64345	64	80618	84	92428	104	01703
5	0.69897	25	39794	45	65321	65	81291	85	92942	105	02119
6	0.77815	26	41497	46	66276	66	81954	86	93450	106	02531
7	.84510	27	43136	47	67210	67	82607	87	93952	107	02938
8	0.90309	28	44716	48	68124	68	83251	88	94448	108	03342
9	0.95424	29	46240	49	69020	69	83885	89	94939	109	03743
10	1.00000	30	47712	50	69897	70	84510	90	95424	110	04139
11	1.04139	31	1.49136	51	1.70757	71	1.85126	91	1.95904	111	2.04532
12	07918	32	50515	52	71600	72	85733	92	96379	112	04922
13	11394	33	51851	53	72428	73	86332	93	96848	113	05308
14	14613	34	53148	54	73239	74	86923	94	97313	114	05690
15	17609	35	54407	55	74036	75	87506	95	97772	115	06070
16	20412	36	55630	56	74819	76	88081	96	98227	116	06446
17	23045	37	56820	57	75587	77	88649	97	98677	117	06819
18	25527	38	57978	58	76343	78	89209	98	99123	118	07188
19	27875	39	59106	59	77085	79	89763	99	99563	119	07555
20	30103	40	60206	60	77815	80	90309	100	2.00000	120	07918

The Method of Stating the ſeveral Caſes in Plane, Middle Latitude and Mercator's Sailing, which may be worked either by the Logarithms, or by the Scale and Compaſſes.

PLANE SAILING.

CASE I.

When the Courſe and Diſtance are given—Say,

As Radius
Is to the Diſtance,
So is the Sine of the Courſe
To the Departure.

and

As Radius
Is to the Diſtance,
So is the Sine Complement of the Courſe
To the Difference of Latitude.

CASE II.

When the Courſe and Difference of Latitude are given—Say,

As the Sine Com. of the Courſe
Is to the Difference of Latitude,
So is the Sine of the Courſe
To the Departure.

and

As Sine Com. of the Courſe
Is to the Difference of Latitude,
So is Radius
To the Diſtance.

CASE III.

When the Courſe and Departure are given—Say

As the Sine of the Courſe
Is to the Departure,
So is the Sine Com. of the Courſe
To the Difference of Latitude.

and

As the Sine of the Courſe
Is to the Departure,
So is Radius
To the Diſtance.

CASE IV.

When the Courſe and Departure are given—Say

As the Diſtance
Is to Radius,
So is the Difference of Latitude
To the Sine Com. of the Courſe

and

As Radius
Is to the Diſtance,
So is the Sine of the Courſe
To the Departure.

CASE V.

When the Diſtance and Departure are given—Say.

As the Diſtance
Is to Radius,
So is the Difference of Latitude
To the Sine Com. of the Courſe.

and

As Radius
Is to the Diſtance,
So is the Sine Com. of the Courſe
To the Difference of Latitude.

CASE VI.

When the Difference of Latitude and Departure are given—Say.

As the Difference of Latitude
Is to Radius
So is the Departure
To the Tangent of the Courſe

and

As the Sine of the Courſe
Is to the Departure,
So is Radius
To the Diſtance.

The Method of Working the CASES in MIDDLE LATITUDE and MERCATOR'S SAILING.

C A S E I.

When the Latitudes and Longitudes of two Places are given—Say

By Mercator's Sailing.

1. As the Meridional Difference of Latitude
Is to Radius
So is the Difference of Longitude
To the Tangent of the Courſe.
2. As the Sine Com. of the Courſe.
Is to the proper Difference of Latitude,
So is the Sine of the Courſe
To the Departure.
3. As the Sine Com. of the Courſe
Is to the proper Difference of Latitude,
So is Radius
To the Diſtance.

By Middle Latitude Sailing.

1. As Radius
Is to the Difference of Longitude,
So is the Sine Com. of Middle Latitude
To the Departure.
2. As the Difference of Latitude
Is to Radius,
So is the Departure
To the Tangent of the Courſe:
3. As the Sine of the Courſe
Is to the Departure,
So is Radius
To the Diſtance.

C A S E II.

When the Courſe and Diff. of Latitude are given, to find the Diſt. and Diff. of Long.—Say,

1. As the Sine Com. of the Courſe
Is to the proper Difference of Latitude,
So is the Sine of the Courſe
To the Departure.
2. As the Sine Com. of the Courſe
Is to the proper Diff. of Latitude,
So is Radius
To the Diſtance.
3. As the Sine Com. of the Courſe
Is to the Meridional Diff. of Latitude,
So is the Sine of the Courſe
To the Diff. of Long.

1. As the Sine Com. of the Courſe
Is to the Difference of Latitude,
So is the Sine of the Courſe
To the Departure.
2. As the Sine Com. of the Courſe
Is to the Difference of Latitude,
So is Radius
To the Diſtance.
3. As Com. of Middle Latitude
Is to the Departure,
So is Radius
To the Difference of Longitude.

C A S E III.

When the Courſe and Diſtance are given, to find the Difference of Latitude and Long.—Say,

1. As Radius
Is to the Diſtance,
So is the Sine Com. of the Courſe
To the Difference of Latitude.
2. As Radius
Is to the Diſtance,
So is the Sine of the Courſe
To the Departure.
3. As Sine Com. of the Courſe
Is to the Meridional Difference of Lat.
So is the Sine of the Courſe
To the Difference of Longitude.

1. As Radius
Is to the Diſtance,
So is the Sine Com. of the Courſe
To the Difference of Latitude.
2. As Radius
Is to the Diſtance,
So is the Sine of the Courſe
To the Departure.
3. As the Sine Com. of Middle Latitude
Is to the Departure,
So is Radius
To the Diff. of Longitude.

C A S E IV.

When the Diff. of Lat. and Departure are given, to find the Diſt. and Diff. of Long.—Say,

1. As the Difference of Latitude
Is to Radius,
So is the Departure
To the Tangent of the Courſe.
2. As the Sine of the Courſe
Is to the Departure,
So is Radius
To the Diſtance.
3. As the Sine Com. of the Courſe
Is to the Meridional Diff. of Latitude,
So is the Sine of the Courſe
To the Diff. of Longitude.

1. As the Difference of Latitude
Is to Radius,
So is the Departure
To the Tangent of the Courſe.
2. As the Sine of the Courſe
Is to the Departure,
So is Radius
To the Diſtance.
3. As the Sine Com. of Middle Latitude
Is to the Departure,
So is Radius
To the Difference of Longitude.

NOTE. Theſe are all the Caſes that can happen at Sea, unleſs a Ship happens to ſail due E. or W. in which Caſe, ſay, As the Sine Com. of the Latitude ſailed in, Is to the Diſtance ſailed, So is Radius to the Difference of Longitude.

B M

Difference of Latitude and Departure for ¼ Point.

Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.
1	01.0	00.0	61	60.9	03.0	121	120.9	05.9	181	180.8	08.9	241	240.7	11.8
2	02.0	00.1	62	61.9	03.0	22	121.9	06.0	82	181.8	08.9	42	241.7	11.9
3	03.0	00.1	63	62.9	03.1	23	122.9	06.0	83	182.8	09.0	43	242.7	11.9
4	04.0	00.2	64	63.9	03.1	24	123.9	06.1	84	183.8	09.0	44	243.7	12.0
5	05.0	00.2	65	64.9	03.2	25	124.9	06.1	85	184.8	09.1	45	244.7	12.0
6	06.0	00.3	66	65.9	03.2	26	125.8	06.2	86	185.8	09.1	46	245.7	12.1
7	07.0	00.3	67	66.9	03.3	27	126.8	06.2	87	186.8	09.2	47	246.7	12.1
8	08.0	00.4	68	67.9	03.3	28	127.8	06.3	88	187.8	09.2	48	247.7	12.2
9	09.0	00.4	69	68.9	03.4	29	128.8	06.3	89	188.8	09.3	49	248.7	12.2
10	10.0	00.5	70	69.9	03.4	30	129.8	06.4	90	189.8	09.3	50	249.7	12.3
11	11.0	00.5	71	70.9	03.5	131	130.8	06.4	191	190.8	09.4	251	250.7	12.3
12	12.0	00.6	72	71.9	03.5	32	131.8	06.5	92	191.8	09.4	52	251.7	12.4
13	13.0	00.6	73	72.9	03.6	33	132.8	06.5	93	192.8	09.5	53	252.7	12.4
14	14.0	00.7	74	73.9	03.6	34	133.8	06.6	94	193.8	09.5	54	253.7	12.5
15	15.0	00.7	75	74.9	03.7	35	134.8	06.6	95	194.8	09.6	55	254.7	12.5
16	16.0	00.8	76	75.9	03.7	36	135.8	06.7	96	195.8	09.6	56	255.7	12.6
17	17.0	00.8	77	76.9	03.8	37	136.8	06.7	97	196.8	09.7	57	256.7	12.6
18	18.0	00.9	78	77.9	03.8	38	137.8	06.8	98	197.8	09.7	58	257.7	12.7
19	19.0	00.9	79	78.9	03.9	39	138.8	06.8	99	198.8	09.8	59	258.7	12.7
20	20.0	01.0	80	79.9	03.9	40	139.8	06.9	200	199.8	09.8	60	259.7	12.8
21	21.0	01.0	81	80.9	04.0	141	140.8	06.9	01	200.8	09.9	261	260.7	12.8
22	22.0	01.1	82	81.9	04.0	42	141.8	07.0	02	201.8	09.9	62	261.7	12.9
23	23.0	01.1	83	82.9	04.1	43	142.8	07.0	03	202.8	10.0	63	262.7	12.9
24	24.0	01.2	84	83.9	04.1	44	145.8	07.1	04	203.8	10.0	64	263.7	13.0
25	25.0	01.2	85	84.9	04.2	45	144.8	07.1	05	204.8	10.1	65	264.7	13.0
26	26.0	01.3	86	85.9	04.2	46	145.8	07.2	06	205.8	10.1	66	265.7	13.1
27	27.0	01.3	87	86.9	04.3	47	146.8	07.2	07	206.8	10.2	67	266.7	13.1
28	28.0	01.4	88	87.9	04.3	48	147.8	07.3	08	207.7	10.2	68	267.7	13.2
29	29.0	01.4	89	88.9	04.4	49	148.8	07.3	09	208.7	10.3	69	268.7	13.2
30	30.0	01.5	90	89.9	04.4	50	149.8	07.4	10	209.7	10.3	70	269.7	13.3
31	31.0	01.5	91	90.9	04.5	151	150.8	07.4	211	210.7	10.4	271	270.7	13.3
32	32.0	01.6	92	91.9	04.5	52	151.8	07.5	12	211.7	10.4	72	271.7	13.4
33	33.0	01.6	93	92.9	04.6	53	152.8	07.5	13	212.7	10.5	73	272.7	13.4
34	34.0	01.7	94	93.9	04.6	54	153.8	07.6	14	213.7	10.5	74	273.7	13.5
35	35.0	01.7	95	94.9	04.7	55	154.8	07.6	15	214.7	10.6	75	274.7	13.5
36	36.0	01.8	96	95.9	04.7	56	155.8	07.7	16	215.7	10.6	76	275.7	13.6
37	37.0	01.8	97	96.9	04.8	57	156.8	07.7	17	216.7	10.7	77	276.7	13.6
38	38.0	01.9	98	97.9	04.8	58	157.8	07.8	18	217.7	10.7	78	277.7	13.7
39	39.0	01.9	99	98.9	04.9	59	158.8	07.8	19	218.7	10.8	79	278.7	13.7
40	40.0	02.0	100	99.9	04.9	60	159.8	07.9	20	219.7	10.8	80	279.7	13.8
41	41.0	02.0	101	100.9	05.0	161	160.8	07.9	221	220.7	10.9	281	280.7	13.8
42	41.9	02.1	02	101.9	05.0	62	161.8	08.0	22	221.7	10.9	82	281.7	13.9
43	42.9	02.1	03	102.9	05.1	63	162.8	08.0	23	222.7	11.0	83	282.7	13.9
44	43.9	02.2	04	103.5	05.1	64	163.8	08.1	24	223.7	11.0	84	283.7	14.0
45	44.9	02.2	05	104.9	05.2	65	164.8	08.1	25	224.7	11.1	85	284.7	14.0
46	45.9	02.3	06	105.9	05.2	66	165.8	08.2	26	225.7	11.1	86	285.7	14.1
47	46.9	02.3	07	106.9	05.3	67	166.8	08.2	27	226.7	11.2	87	286.7	14.1
48	47.9	02.4	08	107.9	05.3	68	167.8	08.3	28	227.7	11.2	88	287.7	14.2
49	48.9	02.4	09	108.9	05.4	69	168.8	08.3	29	228.7	11.3	89	288.7	14.2
50	49.9	02.5	10	109.9	05.4	70	169.8	08.4	30	229.7	11.3	90	289.7	14.2
51	50.9	02.5	111	110.9	05.5	171	170.8	08.4	231	230.7	11.4	291	290.7	14.3
52	51.9	02.6	12	111.9	05.5	72	171.8	08.5	32	231.7	11.4	92	291.6	14.4
53	52.9	02.6	13	112.9	05.5	73	172.8	08.5	33	232.7	11.5	93	292.6	14.4
54	53.9	02.7	14	113.9	05.6	74	173.8	08.5	34	233.7	11.5	94	293.6	14.5
55	54.9	02.7	15	114.9	05.6	75	174.8	08.6	35	234.7	11.5	95	294.6	14.5
56	55.9	02.8	16	115.9	05.7	76	175.8	08.6	36	235.7	11.6	96	295.6	14.5
57	56.9	02.8	17	116.9	05.7	77	176.8	08.7	37	236.7	11.6	97	296.6	14.6
58	57.9	02.9	18	117.9	05.8	78	177.8	08.7	38	237.7	11.7	98	297.6	14.6
59	58.9	02.9	19	118.9	05.8	79	178.8	08.8	39	238.7	11.7	99	298.6	14.7
60	59.9	02.9	20	119.9	05.9	80	179.8	08.8	40	239.7	11.8	300	299.6	14.7
Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.

Aa

for 7 ¾ Points.

Difference of Latitude and Departure for ½ Point.

Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.
1	01.0	00.1	61	60.7	06.0	121	120.4	11.8	181	180.1	17.7	241	239.8	23.6
[illegible]	[illegible]	00.2	62	61.7	06.1	22	121.4	11.9	82	181.1	17.8	42	240.8	23.7
[illegible]	[illegible]	00.3	63	62.7	06.2	23	122.4	12.0	83	181.3	17.9	43	241.8	23.8
[illegible]	[illegible]	00.4	64	63.7	06.3	24	123.4	12.1	84	183.1	18.0	44	242.8	23.9
[illegible]	[illegible]	00.5	65	64.7	06.4	25	124.4	12.2	85	184.1	18.1	45	243.8	24.0
6	[illegible]	00.6	66	65.7	06.5	26	125.4	12.3	86	185.1	18.2	46	244.8	24.1
7	07.[illegible]	00.7	67	66.7	06.6	27	126.4	12.4	87	186.1	18.3	47	245.8	24.2
8	08.[illegible]	00.8	68	67.7	06.7	28	127.4	12.5	88	187.1	18.4	48	246.8	24.3
9	09.0	00.9	69	68.7	06.7	29	128.4	12.6	89	188.1	18.5	49	247.8	24.4
10	10.0	01.0	70	69.7	06.8	30	129.4	12.7	90	189.1	18.6	50	248.8	24.5
11	10.9	01.1	71	70.7	06.9	131	130.4	12.8	191	190.1	18.7	251	249.8	24.6
12	11.9	01.2	72	71.7	07.0	32	131.4	12.9	92	191.1	18.8	52	250.8	24.7
13	12.9	01.3	73	72.6	07.1	33	132.4	13.0	93	192.1	18.9	53	251.8	24.8
14	13.9	01.4	74	73.6	07.2	34	133.4	13.1	94	193.1	19.0	54	252.8	24.9
15	14.9	01.5	75	74.6	07.3	35	134.4	13.2	95	194.1	19.1	55	253.8	25.0
16	15.9	01.6	76	75.6	07.4	36	135.3	13.3	96	195.1	19.2	56	254.8	25.1
17	16.9	01.7	77	76.6	07.5	37	136.3	13.4	97	196.1	19.3	57	255.8	25.2
18	17.9	01.8	78	77.6	07.6	38	137.3	13.5	98	197.0	19.4	58	256.8	25.3
19	18.9	01.9	79	78.6	07.7	39	138.3	13.6	99	198.0	19.5	59	257.8	25.4
20	19.9	02.0	80	79.6	07.8	40	139.3	13.7	200	199.0	19.6	60	258.8	25.5
21	20.9	02.1	81	80.6	07.9	141	140.3	13.8	201	200.0	19.7	261	259.7	25.6
22	21.9	02.2	82	81.6	08.0	42	141.3	13.9	02	201.0	19.8	62	260.7	25.7
23	22.9	02.2	83	82.6	08.1	43	142.3	14.0	03	202.0	19.9	63	261.7	25.8
24	23.9	02.3	84	83.6	08.2	44	143.3	14.1	04	203.0	20.0	64	262.7	25.9
25	24.9	02.4	85	84.6	08.3	45	144.3	14.2	05	204.0	20.1	65	263.7	26.0
26	25.9	02.5	86	85.6	08.4	46	145.3	14.3	06	205.0	20.2	66	264.7	26.1
27	26.9	02.6	87	86.6	08.5	47	146.3	14.4	07	206.0	20.2	67	265.7	26.2
28	27.9	02.7	88	87.6	08.6	48	147.3	14.5	08	207.0	20.3	68	266.7	26.3
29	28.9	02.8	89	88.6	08.7	49	148.3	14.6	09	208.0	20.4	69	267.7	26.4
30	29.9	02.9	90	89.6	08.8	50	149.3	14.7	10	209.0	20.5	70	268.7	26.5
31	30.9	03.0	91	90.6	08.9	151	150.3	14.8	211	210.0	20.6	271	269.7	26.6
32	31.8	03.1	92	91.6	09.0	52	151.3	14.9	12	211.0	20.7	72	270.7	26.7
33	32.8	03.2	93	92.6	09.1	53	152.3	15.0	13	212.0	20.8	73	271.7	26.8
34	33.8	03.3	94	93.5	09.2	54	153.3	15.1	14	213.0	20.9	74	272.7	26.9
35	34.8	03.4	95	94.5	09.3	55	154.3	15.2	15	214.0	21.0	75	273.7	27.0
36	35.[illegible]	03.5	96	95.5	09.4	56	155.3	15.3	16	215.0	21.1	76	274.7	27.1
37	36.8	03.6	97	96.5	09.5	57	156.2	15.4	17	216.0	21.2	77	275.7	27.2
38	37.8	03.7	98	97.5	09.6	58	157.2	15.5	18	217.0	21.3	78	276.7	27.3
39	38.8	03.8	99	98.5	09.7	59	158.2	15.6	19	217.9	21.4	79	277.7	27.4
40	39.8	03.9	100	99.5	09.8	60	159.2	15.7	20	218.9	21.5	80	278.7	27.5
41	40.8	04.0	101	100.5	09.9	161	160.2	15.7	221	219.9	21.6	281	279.6	27.6
42	41.8	04.1	02	101.5	10.0	62	161.2	15.8	22	220.9	21.7	82	280.6	27.7
43	42.8	04.2	03	102.5	10.1	63	162.2	15.9	23	221.9	21.8	83	281.6	27.8
44	43.8	04.3	04	103.5	10.2	64	163.2	16.0	24	222.9	21.9	84	282.6	27.9
45	44.8	04.4	05	104.5	10.3	65	164.2	16.1	25	223.9	22.0	85	283.6	28.0
46	45.8	04.5	06	105.5	10.4	66	165.2	16.2	26	224.9	22.1	86	284.6	28.1
47	46.8	04.6	07	106.5	10.5	67	166.2	16.3	27	225.9	22.2	87	285.6	28.2
48	47.8	04.7	08	107.5	10.6	68	167.2	16.4	28	226.9	22.3	88	286.6	28.3
49	48.8	04.8	09	108.5	10.7	69	168.2	16.5	29	227.9	22.4	89	287.6	28.4
50	49.8	04.9	10	109.5	10.8	70	169.2	16.6	30	228.9	22.5	90	288.6	28.5
51	50.8	05.0	111	110.5	10.9	171	170.2	16.7	231	229.9	22.6	291	289.6	28.6
52	51.8	05.1	12	111.5	11.0	72	171.2	16.8	32	230.9	22.7	92	290.6	28.7
53	52.7	05.2	13	112.5	11.1	73	172.2	16.9	33	231.9	22.8	93	291.6	28.8
54	53.7	05.3	14	113.5	11.2	74	173.2	17.0	34	232.9	22.9	94	292.6	28.9
55	54.7	05.4	15	114.4	11.2	75	174.2	17.1	35	233.9	23.0	95	293.6	29.0
56	55.7	05.5	16	115.4	11.3	76	175.2	17.2	36	234.9	23.1	96	294.6	29.1
57	56.7	05.6	17	116.4	11.4	77	176.2	17.3	37	235.9	23.2	97	295.6	29.2
58	57.7	05.7	18	117.4	11.5	78	177.1	17.4	38	236.9	23.3	98	296.6	29.2
59	58.7	05.8	19	118.4	11.6	79	178.1	17.5	39	237.9	23.4	99	297.6	29.3
60	59.7	05.9	20	119.4	11.7	80	179.1	17.6	40	238.8	23.5	300	298.6	29.4
Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.

for 7 ½ Points.

Difference of Latitude and Departure for ¾ Points

Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.
1	01.0	00.1	61	60.3	08.9	121	119.7	17.7	181	179.0	20.5	241	238.4	35.3
2	02.0	00.3	62	61.3	09.1	122	120.7	17.8	182	180.0	26.7	242	239.4	35.5
3	03.0	00.4	63	62.3	09.2	123	121.7	18.0	183	181.0	25.8	243	240.4	35.6
4	04.0	00.6	64	63.3	09.4	124	122.7	18.2	184	182.0	27.0	244	241.3	35.8
5	04.9	00.7	65	64.3	09.5	125	123.6	18.3	185	183.0	27.1	245	242.3	35.9
6	05.9	00.9	66	65.3	09.7	126	124.6	18.5	186	184.0	27.3	246	243.3	36.1
7	06.9	01.0	67	66.3	09.8	127	125.6	18.6	187	185.0	27.4	247	244.3	36.2
8	07.9	01.2	68	67.3	10.0	128	126.6	18.8	188	186.0	27.6	248	245.3	36.4
9	08.9	01.3	69	68.2	10.1	129	127.6	18.9	189	186.9	27.7	249	246.3	36.5
10	09.9	01.5	70	69.2	10.3	130	128.6	19.1	190	187.9	27.9	250	247.3	36.7
11	10.9	01.6	71	70.2	10.4	131	129.6	19.2	191	188.9	28.0	251	248.3	36.8
12	11.9	01.8	72	71.2	10.6	132	130.6	19.4	192	189.9	28.2	252	249.3	37.0
13	12.9	01.9	73	72.2	10.7	133	131.6	19.5	193	190.9	28.3	253	250.2	37.1
14	13.8	02.1	74	73.2	10.8	134	132.5	19.6	194	191.9	28.5	254	251.2	37.3
15	14.8	02.2	75	74.2	11.0	135	133.5	19.8	195	192.9	28.6	255	252.2	37.4
16	15.8	02.3	76	75.2	11.1	136	134.5	19.9	196	193.9	28.7	256	253.2	37.5
17	16.8	02.5	77	76.2	11.2	137	135.5	20.1	197	194.9	28.9	257	254.2	37.7
18	17.8	02.6	78	77.1	11.4	138	136.5	20.2	198	195.8	29.0	258	255.2	37.8
19	18.8	02.8	79	78.1	11.6	139	137.5	20.4	199	196.8	29.2	259	256.2	38.0
20	19.8	02.9	80	79.1	11 7	140	138.5	20.5	200	197.8	29.3	260	257.2	38.1
21	20.8	03.1	81	80.1	11.9	141	139.5	20.7	201	198.8	29.5	261	258.2	38.3
22	21.8	03.2	82	81.1	12.0	142	140.5	20.8	202	199.8	29.6	262	259.1	38.4
23	22.7	03.4	83	82.1	12.2	143	141.4	21.0	203	200.8	29.8	263	260.1	38.6
24	23.7	03.5	84	83.1	12.3	144	142.4	21.1	204	201.8	29.9	264	261.1	38.7
25	24.7	03.7	85	84.1	12.5	145	143.4	21.3	205	202.8	30.1	265	262.1	38.9
26	25.7	03.8	86	85.1	12.6	146	144.4	21.4	206	203.8	30.2	266	263.1	39.0
27	26.7	04.0	87	86.1	12.8	147	145.4	21.6	207	204.7	30.4	267	264.1	39.2
28	27.7	04.1	88	87.0	12.9	148	146.4	21.7	208	205.7	30.5	268	265.1	39.3
29	28.7	04.3	89	88.0	13.0	149	147.4	21.8	209	206.7	30.6	269	266.1	39.5
30	29.7	04.4	90	89.0	13.2	150	148.4	22.0	210	207.7	30.8	270	267.1	39.6
31	30.7	04.5	91	90.0	13.3	151	149.4	22.1	211	208.7	30.9	271	268.1	39.7
32	31.7	04.7	92	91.0	13.5	152	150.3	22.3	212	209.7	31.1	272	269.0	39.9
33	32.6	04.8	93	92.0	13.6	153	151.3	22.4	213	210.7	31.2	273	270.0	40.0
34	33.6	05.0	94	93.0	13.8	154	152.3	22.6	214	211.7	31.4	274	271.0	40.2
35	34.6	05.1	95	94.0	13.9	155	153.3	22.7	215	212.7	31.5	275	[illegible]2.0	40.3
36	35.6	05.3	96	95.0	14.1	156	154.3	22.9	216	213.7	31.7	276	273.0	40.5
37	36.6	05.4	97	95.9	14.2	157	155.3	23.0	217	214.6	31.8	277	274.0	40.6
38	37.6	05.6	98	96.9	14.4	158	156.3	23.2	218	215.6	32.0	278	275.0	40.8
39	38.6	05.7	99	97.9	14.5	159	157.3	23.3	219	216.6	32.1	279	276.0	40.9
40	39.6	05.9	100	98.9	14.7	160	158.3	23.5	220	217.6	32.3	280	277.0	41.1
41	40.6	06.0	101	99.9	14.8	161	159.2	23.6	221	218.6	32.4	281	277.9	41.2
42	41.5	06.2	102	100.9	15.0	162	160.2	23.8	222	219.6	32.6	282	278.9	41.4
43	42.5	06.3	103	101.9	15.1	163	161.2	23.9	223	220.6	32.7	283	279.9	41.5
44	43.5	06.5	104	102.9	15.3	164	162.2	24.0	224	221.6	32.8	284	280.9	41.6
45	44.5	06.6	105	103.9	15.4	165	163.2	24.2	225	222.6	33.0	285	281.9	41.8
46	45.5	06.7	106	104.8	15.5	166	164.2	24.3	226	223.5	33.1	286	282.9	41.9
47	46.5	06.9	107	105.8	15.7	167	165.2	24.5	227	224.5	33 3	287	283.9	42.1
48	47.5	07.0	108	106.8	15.8	168	166.2	24.6	228	225.5	33.4	288	284.9	42.2
49	48.5	07.2	109	107.8	16.0	169	167.2	24.8	229	226.5	33.6	289	285.9	42.4
50	49.5	07.3	110	108.8	16.1	170	168.1	24.9	230	227.5	33.7	290	286.9	42.5
51	50.4	07.5	111	109.8	16.3	171	169.1	25.1	231	228.5	33.9	291	287.8	42.7
52	51.4	07.6	112	110.8	16.4	172	170.1	25.2	232	229.5	34.0	292	288.8	42.8
53	52.4	07.8	113	111.8	16.6	173	171.1	25.4	233	230.5	34.2	293	289.8	43.0
54	53.4	07.9	114	112.8	16.7	174	172.1	25.5	234	231.5	34.3	294	290.8	43.1
55	54.4	08.1	115	113.7	16.9	175	173.1	25.7	235	232.4	34.5	295	291.8	43.3
56	55.4	08.2	116	114.7	17.0	176	174.1	25.8	236	233.4	34.6	296	292.8	43.4
57	56.4	08.4	117	115.7	17.2	177	175.1	26.0	237	234.4	34.8	297	293.8	43.6
58	57.4	08.5	118	116.7	17.3	178	176.1	26.1	238	235.4	34.9	298	294.8	43.7
59	58.4	08.6	119	117.7	17.5	179	177.1	26.3	239	236.4	35.0	299	295.8	43.8
60	59.3	08.8	120	118.7	17.6	180	178.0	26.4	240	237.4	35.2	300	196.8	44.0
Diſt	Dep.	Lat	Diſt	Dep.	Lat	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.

for 7 ¼ Points.

Difference of Latitude and Departure for 1 Point.

Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.
1	01.0	00.2	61	59.8	11.9	121	118.7	23.6	181	177.5	35.3	241	236.3	47.0
2	02.0	00.4	62	60.8	12.1	22	119.6	23.8	82	178.5	35.5	42	237.3	47.2
3	02.9	00.6	63	61.8	12.3	23	120.6	24.0	83	179.5	35.7	43	238.3	47.4
4	03.9	00.8	64	62.8	12.5	24	121.6	24.2	84	180.4	35.9	44	239.3	47.6
5	04.9	01.0	65	63.7	12.7	25	122.6	24.4	85	181.4	36.1	45	240.3	47.8
6	05.9	01.2	66	64.7	12.9	26	123.6	24.6	86	182.4	36.3	46	241.2	48.0
7	06.9	01.4	67	65.7	13.1	27	124.5	24.8	87	183.4	36.5	47	242.2	48.2
8	07.8	01.6	68	66.7	13.3	28	125.5	25.0	88	184.4	36.7	48	243.2	48.4
9	08.8	01.8	69	67.7	13.5	29	126.5	25.2	89	185.3	36.9	49	244.2	48.6
10	09.8	02.0	70	68.6	13.7	30	127.5	25.4	90	186.3	37.1	50	245.2	48.8
11	10.8	02.1	71	69.6	13.9	131	128.5	25.6	191	187.3	37.3	251	246.1	49.0
12	11.8	02.3	72	70.6	14.0	32	129.5	25.8	02	188.3	37.5	52	247.1	49.2
13	12.7	02.5	73	71.6	14.2	33	130.4	26.0	03	189.3	37.7	53	248.1	49.4
14	13.7	02.7	74	72.6	14.4	34	131.4	26.1	04	190.2	37.9	54	249.1	49.6
15	14.7	02.9	75	73.6	14.6	35	132.4	26.3	05	191.2	38.0	55	250.1	49.8
16	15.7	03.1	76	74.5	14.8	36	133.4	26.5	06	192.2	38.2	56	251.1	50.0
17	16.7	03.3	77	75.5	15.0	37	134.4	26.7	07	193.2	38.4	57	252.1	50.1
18	17.7	03.5	78	76.5	15.2	38	135.3	26.9	08	194.2	38.6	58	253.0	50.3
19	18.6	03.7	79	77.5	15.4	39	136.3	27.1	09	195.2	38.8	59	254.0	50.5
20	19.6	03.9	80	78.5	15.6	40	137.3	27.3	200	196.1	39.0	60	255.0	50.7
21	20.6	04.1	81	79.4	15.8	141	138.3	27.5	201	197.1	39.2	261	256.0	50.9
22	21.6	04.3	82	80.4	16.0	42	139.3	27.7	02	198.1	39.4	62	256.9	51.1
23	22.6	04.5	83	81.4	16.2	43	140.2	27.9	03	199.1	39.6	63	257.9	51.3
24	23.5	04.7	84	82.4	16.4	44	141.2	28.1	04	200.1	39.8	64	258.9	51.5
25	24.5	04.9	85	83.4	16.6	45	142.2	28.3	05	201.0	40.0	65	259.9	51.7
26	25.5	05.1	86	84.3	16.8	46	143.2	28.5	06	202.0	40.2	66	260.9	51.9
27	26.5	05.3	87	85.3	17.0	47	144.2	28.7	07	203.0	40.4	67	261.8	52.1
28	27.5	05.5	88	86.3	17.2	48	145.1	28.9	08	204.0	40.6	68	262.8	52.3
29	28.4	05.7	89	87.3	17.4	49	146.1	29.1	09	205.0	40.8	69	263.8	52.5
30	29.4	05.9	90	88.3	17.6	50	147.1	29.3	110	205.9	41.0	70	264.8	52.7
31	30.4	06.0	91	89.2	17.8	151	148.1	29.5	211	206.9	41.2	271	265.8	52.9
32	31.4	06.2	92	90.2	18.0	52	149.1	29.7	12	207.9	41.4	72	266.7	53.1
33	32.4	06.4	93	91.2	18.1	53	150.0	29.9	13	208.9	41.6	73	267.7	53.3
34	33.3	06.6	94	92.2	18.3	54	151.0	30.0	14	209.9	41.8	74	268.7	53.5
35	34.3	06.8	95	93.2	18.5	55	152.0	30.2	15	210.8	42.0	75	269.7	53.7
36	35.3	07.0	96	94.1	18.7	56	153.0	30.4	16	211.8	42.1	76	270.7	53.9
37	36.3	07.2	97	95.1	18.9	57	154.0	30.6	17	212.8	42.3	77	271.6	54.0
38	37.3	07.4	98	96.1	19.1	58	154.9	30.8	18	213.8	42.5	78	272.6	54.2
39	38.2	07.6	99	97.1	19.3	59	155.9	31.0	19	214.8	42.7	79	273.6	54.4
40	39.2	07.8	100	98.1	19.5	60	156.9	31.2	20	215.7	42.9	80	274.6	54.6
41	40.2	08.0	101	99.1	19.7	161	157.9	31.4	221	216.7	43.1	281	275.6	54.8
42	41.2	08.2	02	100.0	19.9	62	158.9	31.6	22	217.7	43.3	82	276.5	55.0
43	42.2	08.4	03	101.0	20.1	63	159.8	31.8	23	218.7	43.5	83	277.5	55.2
44	43.2	08.6	04	102.0	20.3	64	160.8	32.0	24	219.7	43.7	84	278.5	55.4
45	44.1	08.8	05	103.0	20.5	65	161.8	32.2	25	220.6	43.9	85	279.5	55.6
46	45.1	09.0	06	104.0	20.7	66	162.8	32.4	26	221.6	44.1	86	280.5	55.8
47	46.1	09.2	07	104.9	20.9	67	163.8	32.6	27	222.6	44.3	87	281.5	56.0
48	47.1	09.4	08	105.9	21.1	68	164.7	32.8	28	223.6	44.5	88	282.4	56.2
49	48.1	09.6	09	106.9	21.3	69	165.7	33.0	29	224.6	44.7	89	283.4	56.4
50	49.0	09.8	10	107.9	21.5	70	166.7	33.2	30	225.6	44.9	90	284.4	56.6
51	50.0	10.0	111	108.9	21.7	171	167.7	33.4	231	226.5	45.1	291	285.4	56.8
52	51.0	10.1	12	109.8	21.9	72	168.7	33.6	32	227.5	45.3	92	286.4	57.0
53	52.0	10.3	13	110.8	22.0	73	169.7	33.8	33	228.5	45.5	93	287.3	57.2
54	53.0	10.5	14	111.8	22.2	74	170.6	34.0	34	229.5	45.7	94	288.3	57.4
55	53.9	10.7	15	112.8	22.4	75	171.6	34.1	35	230.5	45.9	95	289.3	57.6
56	54.9	10.9	16	113.8	22.6	76	172.6	34.3	36	231.4	46.0	96	290.3	57.8
57	55.9	11.1	17	114.7	22.8	77	173.6	34.5	37	232.4	46.2	97	291.3	58.0
58	56.9	11.3	18	115.7	23.0	78	174.6	34.7	38	233.4	46.4	98	292.2	58.1
59	57.9	11.5	19	116.7	23.2	79	175.5	34.9	39	234.4	46.6	99	293.2	58.3
60	58.8	11.7	120	117.7	23.4	80	176.5	35.1	40	235.4	46.8	300	294.2	58.5
Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.

for 7 Points

Difference of Latitude and Departure for 1 ¼ Point.

Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.
1	01.0	00.2	61	59.2	14.8	121	117.4	29.4	181	175.6	44.0	241	233.8	58.6
2	01.9	00.5	62	60.1	15.1	22	118.3	29.6	82	176.5	44.2	42	234.7	58.8
3	02.9	00.7	63	61.1	15.3	23	119.3	29.9	83	177.5	44.5	43	235.7	59.0
4	03.9	01.0	64	62.1	15.6	24	120.3	30.1	84	178.5	44.7	44	236.7	59.3
5	04.9	01.2	65	63.1	15.8	25	121.3	30.4	85	179.5	45.0	45	237.7	59.5
6	05.8	01.5	66	64.0	16.0	26	122.2	30.6	86	180.4	45.2	46	238.6	59.8
7	06.8	01.7	67	65.0	16.3	27	123.2	30.9	87	181.4	45.4	47	239.6	60.0
8	07.8	01.9	68	66.0	16.5	28	124.2	31.1	88	182.4	45.7	48	240.6	60.3
9	08.7	02.2	69	66.9	16.8	29	125.1	31.3	89	183.3	45.9	49	241.5	60.5
10	09.7	02.4	70	67.9	17.0	30	126.1	31.6	90	184.3	46.2	50	242.5	60.7
11	10.7	02.7	71	68.9	17.3	131	127.1	31.8	191	185.3	46.4	251	243.5	61.0
12	11.6	02.9	72	69.8	17.5	32	128.0	32.1	92	186.2	46.7	52	244.4	61.2
13	12.6	03.2	73	70.8	17.7	33	129.0	32.3	93	187.2	46.9	53	245.4	61.5
14	13.6	03.4	74	71.8	18.0	34	130.0	32.6	94	188.2	47.1	54	246.4	61.7
15	14.6	03.6	75	72.8	18.2	35	131.0	32.8	95	189.2	47.4	55	247.4	62.0
16	15.5	03.9	76	73.7	18.5	36	131.9	33.0	96	190.1	47.6	56	248.3	62.2
17	16.5	04.1	77	74.7	18.7	37	132.9	33.3	97	191.1	47.9	57	249.3	62.5
18	17.5	04.4	78	75.7	19.0	38	133.9	33.5	98	192.1	48.1	58	250.3	62.7
19	18.4	04.6	79	76.6	19.2	39	134.8	33.8	99	193.0	48.4	59	251.2	62.9
20	19.4	04.9	80	77.6	19.4	40	135.8	34.0	200	194.0	48.6	60	252.2	63.2
21	20.4	05.1	81	78.6	19.7	141	136.8	34.3	201	195.0	48.8	261	253.2	63.4
22	21.3	05.3	82	79.5	19.9	42	137.7	34.5	02	195.9	49.1	62	254.1	63.7
23	22.3	05.6	83	80.5	20.2	43	138.7	34.7	03	196.9	49.3	63	255.1	63.9
24	23.3	05.8	84	81.5	20.4	44	139.7	35.0	04	197.9	49.6	64	256.1	64.2
25	24.3	06.1	85	82.5	20.7	45	140.7	35.2	05	198.9	49.8	65	257.1	64.4
26	25.2	06.3	86	83.4	20.9	46	141.6	35.5	06	199.8	50.1	66	258.0	64.6
27	26.2	06.6	87	84.4	21.1	47	142.6	35.7	07	200.8	50.3	67	259.0	64.9
28	27.2	06.8	88	85.4	21.4	48	143.6	36.0	08	201.8	50.5	68	260.0	65.1
29	28.1	07.0	89	86.3	21.6	49	144.5	36.2	09	202.7	50.8	69	260.9	65.4
30	29.1	07.3	90	87.3	21.9	50	145.5	36.5	10	203.7	51.0	70	261.9	65.6
31	30.1	07.5	191	88.3	22.1	151	146.5	36.7	211	204.7	51.3	271	262.9	65.9
32	31.0	07.8	92	89.2	22.4	52	147.4	36.9	12	205.6	51.5	72	263.8	66.1
33	32.0	08.0	93	90.2	22.6	53	148.4	37.2	13	206.6	51.8	73	264.8	66.3
34	33.0	08.3	94	91.2	22.8	54	149.4	37.4	14	207.6	52.0	74	265.8	66.6
35	34.0	08.5	95	92.2	23.1	55	150.4	37.7	15	208.6	52.2	75	266.8	66.8
36	34.9	08.7	96	93.1	23.3	56	151.3	37.9	16	209.5	52.5	76	267.7	67.1
37	35.9	09.0	97	94.1	23.6	57	152.3	38.2	17	210.5	52.7	77	268.7	67.3
38	36.9	09.2	98	95.1	23.8	58	153.3	38.4	18	211.5	53.0	78	269.7	67.6
39	37.8	09.5	99	96.0	24.1	59	154.2	38.6	19	212.4	53.2	79	270.6	67.8
40	38.8	09.7	200	97.0	24.3	60	155.2	38.9	20	213.4	53.5	80	271.6	68.0
41	39.8	10.0	201	98.0	24.5	161	156.2	39.1	221	214.4	53.7	281	272.6	68.3
42	40.7	10.2	02	98.9	24.8	62	157.1	39.4	22	215.3	53.9	82	273.5	68.5
43	41.7	10.4	03	99.9	25.0	63	158.1	39.6	23	216.3	54.2	83	274.5	68.8
44	42.7	10.7	04	100.9	25.3	64	159.1	39.9	24	217.3	54.4	84	275.5	69.0
45	43.7	10.9	05	101.9	25.5	65	160.1	40.1	25	218.3	54.7	85	276.5	69.3
46	44.6	11.2	06	102.8	25.8	66	161.0	40.3	26	219.2	54.9	86	277.4	69.5
47	45.6	11.4	07	103.8	26.0	67	162.0	40.6	27	220.2	55.2	87	278.4	69.7
48	46.6	11.7	08	104.8	26.2	68	163.0	40.8	28	221.2	55.4	88	279.4	70.0
49	47.5	11.9	09	105.7	26.5	69	163.9	41.1	29	222.1	55.6	89	280.3	70.2
50	48.5	12.2	10	106.7	26.7	70	164.9	41.3	30	223.1	55.9	90	281.3	70.5
51	49.5	12.4	111	107.7	27.0	171	165.9	41.6	231	224.1	56.1	291	282.3	70.7
52	50.4	12.6	12	108.6	27.2	72	166.8	41.8	32	225.0	56.4	92	283.2	71.0
53	51.4	12.9	13	109.6	27.5	73	167.8	42.0	33	226.0	56.6	93	284.2	71.2
54	52.4	13.1	14	110.6	27.7	74	168.8	42.3	34	227.0	56.9	94	285.2	71.4
55	53.4	13.4	15	111.6	27.9	75	169.8	42.5	35	228.0	57.1	95	286.2	71.7
56	54.3	13.6	16	112.5	28.2	76	170.7	42.8	36	228.9	57.3	96	287.1	71.9
57	55.3	13.9	17	113.5	28.4	77	171.7	43.0	37	229.9	57.6	97	288.1	72.2
58	56.3	14.1	18	114.5	28.7	78	172.7	43.3	38	230.9	57.8	98	289.1	72.4
59	57.2	14.3	19	115.4	28.9	79	173.6	43.5	39	231.8	58.1	99	290.0	72.7
60	58.2	14.6	20	116.4	29.2	80	174.6	43.7	40	232.8	58.3	300	291.0	72.9
Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.

for 6 ¾ Points.

Difference of Latitude and Departure for 1 ½ Point.

Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.
1	01.0	00.3	61	58.4	17.7	121	115.8	35.1	181	173.2	52.5	241	230.6	69.9
2	01.9	00.6	62	59.3	18.0	22	116.8	35.4	82	174.2	52.8	42	231.6	70.2
3	02.9	00.9	63	60.3	18.3	23	117.7	35.7	83	175.1	53.1	43	232.5	70.5
4	03.8	01.2	64	61.2	18.6	24	118.7	36.0	84	176.1	53.4	44	233.5	70.8
5	04.8	01.5	65	62.2	18.9	25	119.6	36.3	85	177.0	53.7	45	234.5	71.0
6	05.7	01.7	66	63.2	19.1	26	120.6	36.5	86	178.0	53.9	46	235.4	71.3
7	06.7	02.0	67	64.1	19.4	27	121.5	36.8	87	179.0	54.2	47	236.4	71.6
8	07.7	02.3	68	65.1	19.7	28	122.5	37.1	88	179.9	54.5	48	237.3	71.9
9	08.6	02.6	69	66.0	20.0	29	123.5	37.4	89	180.9	54.8	49	238.3	72.2
10	09.6	02.9	70	67.0	20.3	30	124.4	37.7	90	181.8	55.1	50	239.2	72.5
11	10.5	03.2	71	67.9	20.6	131	125.4	38.0	191	182.8	55.4	251	240.2	72.8
12	11.5	03.5	72	68.8	20.9	32	126.3	38.3	92	183.7	55.7	52	241.2	73.1
13	12.4	03.8	73	69.9	21.2	33	127.3	38.6	93	184.7	56.0	53	242.1	73.4
14	13.4	04.1	74	70.8	21.5	34	128.2	38.9	94	185.7	56.3	54	243.1	73.7
15	14.4	04.4	75	71.8	21.8	35	129.2	39.2	95	186.6	56.6	55	244.0	74.0
16	15.3	04.6	76	72.7	22.0	36	130.2	39.4	96	187.6	56.8	56	245.0	74.2
17	16.3	04.9	77	73.7	22.3	37	131.1	39.7	97	188.5	57.1	57	245.9	74.5
18	17.2	05.2	78	74.6	22.6	38	132.1	40.0	98	189.5	57.4	58	246.9	74.8
19	18.2	05.5	79	75.6	22.9	39	133.0	40.3	99	190.4	57.7	59	247.9	75.1
20	19.1	05.8	80	76.6	23.2	40	134.0	40.6	200	191.4	58.0	60	248.8	75.4
21	20.1	06.1	81	77.5	23.5	141	134.9	40.9	201	192.4	58.3	61	249.8	75.7
22	21.1	06.4	82	78.5	23.8	42	135.9	41.2	02	193.3	58.6	62	250.7	76.0
23	22.0	06.7	83	79.4	24.1	43	136.9	41.5	03	194.3	58.9	63	251.7	76.3
24	23.0	07.0	84	80.4	24.4	44	137.8	41.8	04	195.2	59.2	64	252.6	76.6
25	23.9	07.3	85	81.3	24.7	45	138.8	42.1	05	196.2	59.5	65	253.6	76.9
26	24.9	07.5	86	82.3	24.9	46	139.7	42.3	06	197.1	59.7	66	254.6	77.1
27	25.8	07.8	87	83.3	25.2	47	140.7	42.6	07	198.1	60.0	67	255.5	77.4
28	26.8	08.1	88	84.2	25.5	48	141.6	42.9	08	199.1	60.3	68	256.5	77.7
29	27.8	08.4	89	85.2	25.8	49	142.6	43.2	09	200.0	60.6	69	257.4	78.0
30	28.7	08.7	90	86.1	26.1	50	143.5	43.5	10	201.0	60.9	70	258.4	78.3
31	29.7	09.0	91	87.1	26.4	151	144.5	43.8	211	201.9	61.2	271	259.3	78.6
32	30.6	09.3	92	88.0	26.7	52	145.5	44.1	12	202.9	61.5	72	260.3	78.9
33	31.6	09.6	93	89.0	27.0	53	146.4	44.4	13	203.8	61.8	73	261.3	79.2
34	32.5	09.9	94	90.0	27.3	54	147.4	44.7	14	204.8	62.1	74	262.2	79.5
35	33.5	10.2	95	90.9	27.6	55	148.3	45.0	15	205.8	62.4	75	263.2	79.8
36	34.5	10.4	96	91.9	27.8	56	149.3	45.2	16	206.7	62.6	76	264.1	80.0
37	35.4	16.7	97	92.8	28.1	57	150.2	45.5	17	207.7	62.9	77	265.1	80.3
38	36.4	11.0	98	93.8	28.4	58	151.2	45.8	18	208.6	63.2	78	266.0	80.6
39	37.3	11.3	99	94.7	28.7	59	152.2	46.1	19	209.6	63.5	79	267.0	80.9
40	38.3	11.6	100	95.7	29.0	60	153.1	46.4	20	210.5	63.8	80	268.0	81.2
41	39.2	11.9	101	96.7	29.3	161	154.1	46.7	221	211.5	64.1	281	268.9	81.5
42	40.2	12.2	02	97.6	29.6	62	155.0	47.0	22	212.5	64.4	82	269.9	81.8
43	41.2	12.5	03	98.6	29.9	63	156.0	47.3	23	213.4	64.7	83	270.8	82.1
44	42.1	12.8	04	99.5	30.2	64	156.9	47.6	24	214.4	65.0	84	271.8	82.4
45	43.1	13.1	05	100.5	30.5	65	157.9	47.9	25	215.3	65.3	85	272.7	82.7
46	44.0	13.3	06	101.4	30.7	66	158.9	48.1	26	216.3	65.5	86	273.7	82.9
47	45.0	13.6	07	102.4	31.0	67	159.8	48.4	27	217.2	65.8	87	274.7	83.2
48	45.9	13.9	08	103.4	31.3	68	160.8	48.7	28	218.2	66.1	88	275.6	83.5
49	46.9	14.2	09	104.3	31.6	69	161.7	49.0	29	219.2	66.4	89	276.6	83.9
50	47.9	14.5	10	105.3	31.9	70	162.7	49.3	30	220.1	66.7	90	277.5	84.2
51	48.8	14.8	11	106.2	32.2	171	163.6	49.6	231	221.1	67.0	291	278.5	84.4
52	49.8	15.1	12	107.2	32.5	72	164.6	49.9	32	222.0	67.3	92	279.4	84.7
53	50.7	15.4	13	108.1	32.8	73	165.6	50.2	33	223.0	67.6	93	280.4	85.1
54	51.7	15.7	14	109.1	33.1	74	166.5	50.5	34	223.9	67.9	94	281.4	85.3
55	52.6	16.0	15	110.1	33.4	75	167.5	50.8	35	224.9	68.2	95	282.3	85.6
56	53.6	16.2	16	111.0	33.6	76	168.4	51.0	36	225.9	68.4	96	283.3	85.8
57	54.5	16.5	17	112.0	33.9	77	169.4	51.3	37	226.8	68.7	97	284.2	86.1
58	55.5	16.8	18	112.9	34.2	78	170.3	51.6	38	227.8	69.0	98	285.2	86.4
59	56.5	17.1	19	113.9	34.5	79	171.3	51.9	39	228.7	69.3	99	286.1	86.7
60	57.4	17.4	20	114.8	34.8	80	172.3	52.2	40	229.7	69.6	300	287.1	87.0
Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.

for 6 ½ Points.

Difference of Latitude and Departure for 1 ¾ Points.

Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.
1	00.9	00.3	61	57.4	20.5	121	113.9	40.8	181	170.4	61.0	241	226.9	81.2
2	01.9	00.7	62	58.4	20.9	122	114.9	41.1	182	171.4	61.3	242	227.8	81.5
3	02.8	01.0	63	59.3	21.2	123	115.8	41.4	183	172.3	61.6	243	228.8	81.8
4	03.8	01.3	64	60.3	21.6	124	116.7	41.8	184	173.2	62.0	244	229.7	82.2
5	04.7	01.7	65	61.2	21.9	125	117.7	42.1	185	174.2	62.3	245	230.7	82.5
6	05.6	02.0	66	62.1	22.2	126	118.6	42.4	186	175.1	62.6	246	231.6	82.9
7	06.6	02.4	67	63.1	22.6	127	119.6	42.8	187	176.1	63.0	247	232.5	83.2
8	07.5	02.7	68	64.0	22.9	128	120.5	43.1	188	177.0	63.3	248	233.5	83.5
9	08.5	03.0	69	65.0	23.2	129	121.5	43.4	189	177.9	63.7	249	234.4	83.9
10	09.4	03.4	70	65.9	23.6	130	122.4	43.8	190	178.9	64.0	250	235.4	84.2
11	10.4	03.7	71	66.8	23.9	131	123.3	44.1	191	179.8	64.3	251	236.3	84.5
12	11.3	04.0	72	67.8	24.2	132	124.3	44.5	192	180.8	64.7	252	237.3	84.9
13	12.2	04.4	73	68.8	24.6	133	125.2	44.8	193	181.7	65.0	253	238.2	85.2
14	13.2	04.7	74	69.7	24.9	134	126.2	45.1	194	182.6	65.3	254	239.1	85.5
15	14.1	05.1	75	70.6	25.3	135	127.1	45.5	195	183.6	65.7	255	240.1	85.9
16	15.1	05.4	76	71.6	25.6	136	128.0	45.8	196	184.5	66.0	256	241.0	86.2
17	16.0	05.7	77	72.5	25.9	137	129.0	46.1	197	185.5	66.3	257	242.0	86.6
18	17.0	06.1	78	73.4	26.3	138	129.9	46.5	198	186.4	66.7	258	242.9	86.9
19	17.9	06.4	79	74.4	26.6	139	130.9	46.8	199	187.4	67.0	259	243.9	87.2
20	18.8	06.7	80	75.3	26.9	140	131.8	47.2	200	188.3	67.4	260	244.8	87.6
21	19.8	07.1	81	76.3	27.3	141	132.8	47.5	201	189.2	67.7	261	245.7	87.9
22	20.7	07.4	82	77.2	27.6	142	133.7	47.8	202	190.2	68.0	262	246.7	88.2
23	21.7	07.7	83	78.1	28.0	143	134.6	48.2	203	191.1	68.4	263	247.6	88.6
24	22.6	08.1	84	79.1	28.3	144	135.6	48.5	204	192.1	68.7	264	248.6	88.9
25	23.5	08.4	85	80.0	28.6	145	136.5	48.8	205	193.0	69.0	265	249.5	89.2
26	24.5	08.8	86	81.0	29.0	146	137.5	49.2	206	194.0	69.4	266	250.4	89.6
27	25.4	09.1	87	81.9	29.3	147	138.4	49.5	207	194.9	69.7	267	251.4	89.9
28	26.4	09.4	88	82.8	29.6	148	139.3	49.8	208	195.8	70.1	268	252.3	90.3
29	27.3	09.8	89	83.8	30.0	149	140.3	50.2	209	196.8	70.4	269	253.3	90.6
30	28.2	10.1	90	84.7	30.3	150	141.2	50.5	210	197.7	70.7	270	254.2	90.9
31	29.2	10.4	91	85.7	30.6	151	142.2	50.9	211	198.7	71.1	271	255.1	91.3
32	30.1	10.8	92	86.6	31.0	152	143.1	51.2	212	199.6	71.4	272	256.1	91.6
33	31.1	11.1	93	87.6	31.3	153	144.0	51.5	213	200.5	71.7	273	257.0	91.9
34	32.0	11.5	94	88.5	31.7	154	145.0	51.9	214	201.5	72.1	274	258.0	92.3
35	33.0	11.8	95	89.4	32.0	155	145.9	52.2	215	202.4	72.4	275	258.9	92.6
36	33.9	12.1	96	90.4	32.3	156	146.9	52.5	216	203.4	72.7	276	259.9	93.0
37	34.8	12.5	97	91.3	32.7	157	147.8	52.9	217	204.3	73.1	277	260.8	93.3
38	35.8	12.8	98	92.3	33.0	158	148.8	53.2	218	205.2	73.4	278	261.7	93.6
39	36.7	13.1	99	93.2	33.3	159	149.7	53.6	219	206.2	73.8	279	262.7	94.0
40	37.7	13.5	100	94.2	33.7	160	150.6	53.0	220	207.1	74.1	280	263.6	94.3
41	38.6	13.8	101	95.1	34.0	161	151.6	54.2	221	208.1	74.4	281	264.0	94.6
42	39.5	14.1	102	96.0	34.4	162	152.5	54.6	222	209.0	74.8	282	265.5	95.0
43	40.5	14.5	103	97.0	34.7	163	153.5	54.9	223	210.0	75.1	283	266.4	95.3
44	41.4	14.8	104	97.9	35.0	164	154.4	55.2	224	210.9	75.4	284	267.4	95.6
45	42.4	15.2	105	98.9	35.4	165	155.3	55.6	225	211.8	75.8	285	268.3	96.0
46	43.3	15.5	106	99.7	35.7	166	156.3	55.9	226	212.8	76.1	286	269.3	96.3
47	44.3	15.8	107	100.8	36.0	167	157.2	56.2	227	213.7	76.5	287	270.2	96.7
48	45.2	16.2	108	101.7	36.4	168	158.2	56.6	228	214.7	76.8	288	271.2	97.0
49	46.1	16.5	109	102.7	36.7	169	159.1	56.9	229	215.6	77.1	289	272.1	97.3
50	47.1	16.8	110	103.6	37.0	170	160.1	57.3	230	216.5	77.5	290	273.0	97.7
51	48.0	17.2	111	104.5	37.4	171	161.0	57.6	231	217.5	77.8	291	274.0	98.0
52	49.0	17.5	112	105.4	37.7	172	161.9	57.9	232	218.4	78.1	292	274.9	98.3
53	49.9	17.9	113	106.4	38.1	173	162.9	58.4	233	219.4	78.5	293	275.9	98.7
54	50.8	18.2	114	107.3	38.4	174	163.8	58.6	234	220.3	78.8	294	276.8	99.0
55	51.8	18.5	115	108.3	38.7	175	164.8	58.9	235	221.3	79.1	295	277.7	99.4
56	52.7	18.9	116	109.2	39.1	176	165.7	59.3	236	222.2	79.5	296	278.7	99.7
57	53.7	19.2	117	110.2	39.4	177	166.6	59.6	237	223.1	79.8	297	279.6	100.0
58	54.6	19.5	118	111.1	39.7	178	167.6	60.0	238	224.1	80.2	298	280.6	100.4
59	55.5	19.9	119	112.0	40.1	179	168.5	60.3	239	225.0	80.5	299	281.5	100.7
60	56.5	20.2	120	113.0	40.4	180	169.5	60.6	240	226.0	80.8	300	282.5	101.0
Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Lat.	Lat.	Diſt	Dep.	Lat.

for 6 ¼ Points.

Difference of Latitude and Departure for 2 Points.

Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.
1	00.9	00.4	61	56.4	23.3	121	111.8	46.3	181	167.2	69.3	241	222.7	92.2
2	01.8	00.8	62	57.3	23.7	22	112.7	46.7	82	168.2	69.7	42	223.6	92.6
3	02.8	01.1	63	58.2	24.1	23	113.6	47.1	83	169.1	70.0	43	224.5	93.0
4	03.7	01.5	64	59.1	24.5	24	114.6	47.5	84	170.0	70.4	44	225.4	93.4
5	04.6	01.9	65	60.1	24.9	25	115.5	47.8	85	170.9	70.8	45	226.4	93.8
6	05.5	02.3	66	61.0	25.3	26	116.4	48.2	86	171.9	71.2	46	227.3	94.1
7	06.5	02.7	67	61.9	25.6	27	117.3	48.6	87	172.8	71.6	47	228.2	94.5
8	07.4	03.1	68	62.8	26.0	28	118.3	49.0	88	173.7	72.0	48	229.1	94.9
9	08.3	03.4	69	63.8	26.4	29	119.2	49.4	89	174.6	72.3	49	230.1	95.3
10	09.2	03.8	70	64.7	26.8	30	120.1	49.8	90	175.6	72.7	50	231.0	95.7
11	10.2	04.2	71	65.6	27.2	131	121.0	50.1	191	176.5	73.1	251	231.9	96.1
12	11.1	04.6	72	66.5	27.6	32	122.0	50.5	92	177.4	73.5	52	232.8	96.4
13	12.0	05.0	73	67.5	27.9	33	122.9	50.9	93	178.3	73.9	53	233.8	96.8
14	12.9	05.4	74	68.4	28.3	34	123.8	51.3	94	179.2	74.2	54	234.7	97.2
15	13.9	05.7	75	69.3	28.7	35	124.7	51.7	95	180.2	74.6	55	235.6	97.6
16	14.8	06.1	76	70.2	29.1	36	125.7	52.0	96	181.1	75.0	56	236.5	98.0
17	15.7	06.5	77	71.1	29.5	37	126.6	52.4	97	182.0	75.4	57	237.5	98.4
18	16.6	06.9	78	72.1	29.9	38	127.5	52.8	98	182.9	75.8	58	238.4	98.7
19	17.6	07.3	79	73.0	30.2	39	128.4	53.2	99	183.9	76.2	59	239.3	99.1
20	18.5	07.7	80	73.9	30.6	40	129.4	53.6	200	184.8	76.5	60	240.2	99.5
21	19.4	08.0	81	74.8	31.0	141	130.3	54.0	201	185.7	76.9	261	241.1	99.9
22	20.3	08.4	82	75.8	31.4	42	131.2	54.3	02	186.6	77.3	62	242.1	100.3
23	21.3	08.8	83	76.7	31.8	43	132.1	54.7	03	187.6	77.7	63	243.0	100.7
24	22.2	09.2	84	77.6	32.1	44	133.0	55.1	04	188.5	78.1	64	243.9	101.0
25	23.1	09.6	85	78.5	32.5	45	134.0	55.5	05	189.4	78.5	65	244.8	101.4
26	24.0	10.0	86	79.5	32.9	46	134.9	55.9	06	190.3	78.8	66	245.8	101.8
27	24.9	10.3	87	80.4	33.3	47	135.8	56.3	07	191.3	79.2	67	246.7	102.2
28	25.9	10.7	88	81.3	33.7	48	136.7	56.6	08	192.2	79.6	68	247.6	102.6
29	26.8	11.1	89	82.2	34.1	49	137.7	57.0	09	193.1	80.0	69	248.5	103.0
30	27.7	11.5	90	83.1	34.4	50	138.6	57.4	10	194.0	80.4	70	249.5	103.3
31	28.6	11.9	91	84.1	34.8	151	139.5	57.8	211	194.9	80.8	271	250.4	103.7
32	29.6	12.2	92	85.0	35.2	52	140.4	58.2	12	195.9	81.1	72	251.3	104.1
33	30.5	12.6	93	85.9	35.6	53	141.4	58.6	13	196.8	81.5	73	252.2	104.5
34	31.4	13.0	94	86.9	36.0	54	142.3	58.9	14	197.7	81.9	74	253.2	104.9
35	32.3	13.4	95	87.8	36.4	55	143.2	59.3	15	198.6	82.3	75	254.1	105.2
36	33.3	13.8	96	88.7	36.7	56	144.1	59.7	16	199.6	82.7	76	255.0	105.6
37	34.2	14.2	97	89.6	37.1	57	145.1	60.1	17	200.5	83.0	77	255.9	106.0
38	35.1	14.5	98	90.6	37.5	58	146.0	60.5	18	201.4	83.4	78	256.9	106.4
39	36.0	14.9	99	91.5	37.9	59	146.9	60.9	19	202.3	83.8	79	257.8	106.8
30	37.0	15.3	100	92.4	38.3	60	147.8	61.2	20	203.3	84.2	80	258.7	107.2
41	37.9	15.7	101	93.3	38.7	161	148.8	61.6	221	204.2	84.6	281	259.6	107.5
42	38.8	16.1	02	94.2	39.0	62	149.7	62.0	22	205.1	85.0	82	260.6	107.9
43	39.7	16.5	03	95.1	39.4	63	150.6	62.4	23	206.0	85.3	83	261.5	108.3
44	40.6	16.8	04	96.1	39.8	64	151.5	62.8	24	207.0	85.7	84	262.4	108.7
45	41.6	17.2	05	97.0	40.2	65	152.5	63.1	25	207.9	86.1	85	263.3	109.1
46	42.5	17.6	06	97.9	40.6	66	153.4	63.5	26	208.8	86.5	86	264.[illegible]	109.5
47	43.4	18.0	07	98.9	41.0	67	154.3	63.9	27	209.7	86.9	87	265.2	109.8
48	44.4	18.4	08	99.8	41.3	68	155.2	64.3	28	210.7	87.3	88	266.1	110.2
49	45.3	18.8	09	100.7	41.7	69	156.1	64.7	29	211.6	87.6	89	267.0	110.6
50	46.2	19.1	10	101.6	42.1	70	157.1	65.1	30	212.5	88.0	90	267.9	111.0
51	47.1	19.5	111	102.6	42.5	171	158.0	65.4	231	213.4	88.4	291	268.9	111.4
52	48.0	19.9	12	103.5	42.9	72	158.9	65.8	32	214.4	88.8	92	269.8	111.8
53	49.0	20.3	13	104.4	43.2	73	159.8	66.2	33	215.3	89.2	93	270.7	112.1
54	49.9	20.7	14	105.3	43.6	74	160.8	66.6	34	216.2	89.6	94	271.6	112.5
55	50.8	21.0	15	106.3	44.0	75	161.7	67.0	35	217.1	89.9	95	272.6	112.9
56	51.7	21.4	16	107.2	44.4	76	162.6	67.4	36	218.0	90.3	96	273.5	113.3
57	52.7	21.8	17	108.1	44.8	77	163.5	67.7	37	219.0	90.7	97	274.4	113.7
58	53.6	22.2	18	109.0	45.2	78	164.5	68.1	38	219.9	91.1	98	275.3	114.0
59	54.5	22.6	19	109.9	45.5	79	165.4	68.5	39	220.8	91.5	99	276.3	114.4
60	55.4	23.0	20	110.9	45.9	80	166.3	68.9	40	221.7	91.9	300	277.2	114.8
Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.

for 6 Points.

Difference of Latitude and Departure for 2¼ Points.

Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.
1	00.9	00.4	61	55.1	26.1	121	109.4	51.7	181	163.6	77.4	241	217.8	103.0
2	01.8	00.9	62	56.0	26.5	22	110.3	52.2	82	164.5	77.8	42	218.7	103.5
3	02.7	01.3	63	57.0	26.9	23	111.2	52.6	83	165.4	78.2	43	219.6	103.9
4	03.6	01.7	64	57.9	27.4	24	112.1	53.0	84	166.3	78.7	44	220.5	104.3
5	04.5	02.1	65	58.8	27.8	25	113.0	53.5	85	167.2	79.1	45	221.4	104.8
6	05.4	02.6	66	59.7	28.2	26	113.9	53.9	86	168.1	79.5	46	222.4	105.2
7	06.3	03.0	67	60.6	28.6	27	114.8	54.3	87	169.0	80.0	47	223.3	105.6
8	07.2	03.4	68	61.5	29.1	28	115.7	54.7	88	169.9	80.4	48	224.2	106.0
9	08.1	03.8	69	62.4	29.5	29	116.6	55.2	89	170.8	80.8	49	225.1	106.5
10	09.0	04.3	70	63.3	29.9	30	117.5	55.6	90	171.7	81.2	50	226.0	106.9
11	09.9	04.7	71	64.2	30.4	131	118.4	56.0	191	172.6	81.7	251	226.9	107.3
12	10.8	05.1	72	65.1	30.8	32	119.3	56.4	92	173.6	82.1	52	227.8	107.8
13	11.8	05.6	73	66.0	31.2	33	120.2	56.9	93	174.5	82.5	53	228.7	108.2
14	12.7	06.0	74	66.9	31.6	34	121.1	57.3	94	175.4	83.0	54	229.6	108.6
15	13.6	06.4	75	67.8	32.1	35	122.0	57.7	95	176.3	83.4	55	230.5	109.0
16	14.5	06.8	76	68.7	32.5	36	122.9	58.2	96	177.2	83.8	56	231.4	109.5
17	15.4	07.3	77	69.6	32.9	37	123.8	58.6	97	178.1	84.2	57	232.3	109.9
18	16.3	07.7	78	70.5	33.4	38	124.7	59.0	98	179.0	84.7	58	233.2	110.3
19	17.2	08.1	79	71.4	33.8	39	125.6	59.4	99	179.9	85.1	59	234.1	110.7
20	18.1	08.6	80	72.3	34.2	40	126.5	59.9	200	180.8	85.5	60	235.0	111.2
21	19.0	09.0	81	73.2	34.6	141	127.4	60.3	201	181.7	85.9	261	235.9	111.6
22	19.9	09.4	82	74.1	35.1	42	128.4	60.7	02	182.6	86.4	62	236.8	112.0
23	20.8	09.8	83	75.0	35.5	43	129.3	61.1	03	183.5	86.8	63	237.7	112.5
24	21.7	10.3	84	75.9	35.9	44	130.2	61.6	04	184.4	87.2	64	238.6	112.9
25	22.6	10.7	85	76.8	36.3	45	131.1	62.0	05	185.3	87.7	65	239.5	113.3
26	23.5	11.1	86	77.7	36.8	46	132.0	62.4	06	186.2	88.1	66	240.4	113.7
27	24.4	11.5	87	78.6	37.2	47	132.9	62.9	07	187.1	88.5	67	241.3	114.2
28	25.3	12.0	88	79.6	37.6	48	133.8	63.3	08	188.0	88.9	68	242.2	114.6
29	26.2	12.4	89	80.5	38.1	49	134.7	63.7	09	188.9	89.4	69	243.1	115.0
30	27.1	12.8	90	81.4	38.5	50	135.6	64.1	10	189.8	89.8	70	244.0	115.5
31	28.0	13.3	91	82.3	38.9	151	136.5	64.6	211	190.7	90.2	271	245.0	115.9
32	28.9	13.7	92	83.2	39.3	52	137.4	65.0	12	191.6	90.6	72	245.9	116.3
33	29.8	14.1	93	84.1	39.8	53	138.3	65.4	13	192.5	91.1	73	246.8	116.7
34	30.7	14.5	94	85.0	40.2	54	139.2	65.8	14	193.4	91.5	74	247.7	117.2
35	31.6	15.0	95	85.9	40.6	55	140.1	66.3	15	194.3	91.9	7	248.6	117.6
36	32.5	15.4	96	86.8	41.0	56	141.0	66.7	16	195.2	92.4	76	249.5	118.0
37	33.4	15.8	97	87.7	41.5	57	141.9	67.1	17	196.1	92.8	77	250.4	118.4
38	34.4	16.2	98	88.6	41.9	58	142.8	67.6	18	197.0	93.2	78	251.3	118.9
39	35.3	16.7	99	89.5	42.3	59	143.7	68.0	19	197.9	93.6	79	252.2	119.3
40	36.2	17.1	100	90.4	42.8	60	144.6	68.4	20	198.8	94.1	80	253.1	119.7
41	37.1	17.5	101	91.3	43.2	161	145.5	68.8	221	199.8	94.5	281	254.0	120.2
42	38.0	18.0	02	92.2	43.6	62	146.4	69.3	22	200.7	94.9	82	254.9	120.6
43	38.9	18.4	03	93.1	44.0	63	147.3	69.7	23	201.6	95.4	83	255.8	121.0
44	39.8	18.8	04	94.0	44.5	64	148.2	70.1	24	202.5	95.8	84	256.7	121.4
45	40.7	19.2	05	94.9	44.9	65	149.1	70.6	25	203.4	96.2	85	257.6	121.9
46	41.6	19.7	06	95.8	45.3	66	150.0	71.0	26	204.3	96.6	86	258.5	122.3
47	42.5	20.1	07	96.7	45.8	67	151.0	71.4	27	205.2	97.1	87	259.4	122.7
48	43.4	20.5	08	97.6	46.2	68	151.9	71.8	28	206.1	97.5	88	260.3	123.1
49	44.3	21.0	09	98.5	46.6	69	152.8	72.3	29	207.0	97.9	89	261.2	123.6
50	45.2	21.4	10	99.4	47.0	70	153.7	72.7	30	207.9	98.3	90	262.1	124.0
51	46.1	21.8	111	100.3	47.5	171	154.6	73.1	231	208.8	98.8	291	263.0	124.4
52	47.0	22.2	12	101.2	47.9	72	155.5	73.5	32	209.7	99.1	92	263.9	124.9
53	47.9	22.7	13	102.1	48.3	73	156.4	74.0	33	210.6	99.6	93	264.8	125.3
54	48.8	23.1	14	103.0	48.7	74	157.3	74.4	34	211.5	100.1	94	265.7	125.7
55	49.7	23.5	15	103.9	49.2	75	158.2	74.8	35	212.4	100.5	95	266.6	126.1
56	50.6	23.9	16	104.8	49.6	76	159.1	75.3	36	213.3	100.9	96	267.6	126.6
57	51.5	24.4	17	105.8	50.0	77	160.0	75.7	37	214.2	101.3	97	268.5	127.0
58	52.4	24.8	18	106.7	50.5	78	160.9	76.1	38	215.1	101.8	98	269.4	127.4
59	53.3	25.2	19	107.6	50.9	79	161.8	76.5	39	216.0	102.2	99	270.3	127.8
60	54.2	25.7	20	108.5	51.3	80	162.7	77.0	40	216.9	102.6	300	271.2	128.3
Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.

B b

for [illegible] Points.

Difference of Latitude and Departure for 2 ½ Points.

Diſt	Lat	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep
1	00.9	00.5	61	53.8	28.7	121	106.7	57.0	181	159.6	85.3	241	212.6	113.5
2	01.8	00.9	62	54.7	29.2	22	107.6	57.5	82	160.5	85.8	42	213.4	114.0
3	02.6	01.4	63	55.6	29.7	23	108.5	58.0	83	161.4	86.2	43	214.3	114.5
4	03.5	01.9	64	56.4	30.2	24	109.4	58.4	84	162.3	86.7	44	215.2	115.0
5	04.4	02.4	65	57.3	30.6	25	110.3	58.9	85	163.2	87.2	45	216.1	115.4
6	05.3	02.8	66	58.2	31.1	26	111.0	59.4	86	164.1	87.6	46	217.0	115.9
7	06.2	03.3	67	59.1	31.6	27	112.1	59.8	87	164.9	88.1	47	217.9	116.4
8	07.1	03.8	68	60.0	32.0	28	112.9	60.3	88	165.8	88.6	48	218.7	116.8
9	07.9	04.2	69	60.9	32.5	29	113.8	60.8	89	166.7	89.1	49	219.6	117.3
10	08.8	04.7	70	61.7	33.0	30	114.7	61.3	90	167.6	89.5	50	220.5	117.8
11	09.7	05.2	71	62.6	33.5	131	115.5	61.7	191	168.5	90.0	251	221.4	118.3
12	10.6	05.7	72	63.5	33.9	32	116.4	62.2	92	169.3	90.5	52	222.3	118.7
13	11.5	06.1	73	64.4	34.4	33	117.3	62.7	93	170.2	90.9	53	223.1	119.2
14	12.3	06.6	74	65.3	34.9	34	118.2	63.1	94	171.1	91.4	54	224.0	119.7
15	13.2	07.1	75	66.2	35.3	35	119.1	63.6	95	172.0	91.9	55	224.9	120.1
16	14.2	07.5	76	67.0	35.8	36	120.0	64.1	96	172.9	92.4	56	225.8	120.6
17	15.0	08.0	77	67.9	36.3	37	120.8	64.5	97	173.8	92.8	57	226.7	121.1
18	15.9	08.5	78	68.8	36.8	38	121.7	65.0	98	174.6	93.3	58	227.6	121.6
19	16.8	09.0	79	69.7	37.2	39	122.6	65.5	99	175.5	93.8	59	228.4	122.0
20	17.6	09.4	80	70.6	37.7	40	123.5	66.0	200	176.4	94.2	60	229.3	122.5
21	18.5	09.9	81	71.4	38.2	141	124.4	66.4	201	177.3	94.7	261	230.2	123.0
22	19.4	10.4	82	72.3	38.6	42	125.2	66.9	02	178.2	95.2	62	231.1	123.4
23	20.3	10.8	83	73.2	39.1	43	126.1	67.4	03	179.0	95.6	63	232.0	123.9
24	21.2	11.3	84	74.1	39.6	44	127.0	67.8	04	179.9	96.1	64	232.8	124.4
25	22.1	11.8	85	75.0	40.1	45	127.9	68.3	05	180.8	96.6	65	233.7	124.9
26	22.9	12.3	86	75.9	40.5	46	128.8	68.8	06	181.7	97.1	66	234.6	125.3
27	23.8	12.7	87	76.7	41.0	47	129.6	69.3	07	182.6	97.5	67	235.5	125.8
28	24.7	13.2	88	77.6	41.5	48	130.5	69.7	08	183.5	98.0	68	236.4	126.3
29	25.6	13.7	89	78.5	41.9	49	131.4	70.2	09	184.3	98.5	69	237.3	126.7
30	26.5	14.1	90	79.4	42.4	50	132.3	70.7	10	185.2	98.9	70	238.1	127.2
31	27.3	14.6	91	80.3	42.9	151	133.2	71.1	211	186.1	99.4	271	239.0	127.7
32	28.2	15.1	92	81.1	43.4	52	134.1	71.6	12	187.0	99.9	72	239.9	128.2
33	29.1	15.5	93	82.0	43.8	53	134.9	72.1	13	187.9	100.4	73	240.8	128.6
34	30.0	16.0	94	82.9	44.3	54	135.8	72.6	14	188.7	100.8	74	241.7	129.1
35	30.9	16.5	95	83.8	44.8	55	136.7	73.0	15	189.6	101.3	75	242.5	129.6
36	31.8	17.0	96	84.7	45.2	56	137.6	73.5	16	190.5	101.8	76	243.4	130.0
37	32.6	17.4	97	85.6	45.7	57	138.5	74.0	17	191.4	102.2	77	244.3	130.5
38	33.5	17.9	98	86.4	46.2	58	139.4	74.4	18	192.3	102.7	78	245.2	131.0
39	34.4	18.4	99	87.3	46.6	59	140.2	74.9	19	193.2	103.2	79	246.1	131.5
40	35.3	18.8	100	88.2	47.1	60	141.1	75.4	20	194.0	103.7	80	247.0	131.9
41	36.2	19.3	101	89.1	47.6	161	142.0	75.9	221	194.9	104.1	281	247.8	132.4
42	37.0	19.8	02	90.0	48.1	62	142.9	76.3	22	195.8	104.6	82	248.7	132.9
43	37.9	20.3	03	90.8	48.5	63	143.8	76.8	23	196.7	105.1	83	249.6	133.3
44	38.8	20.7	04	91.7	49.0	64	144.6	77.3	24	197.6	105.5	84	250.5	133.8
45	39.7	21.2	05	92.6	49.5	65	145.5	77.7	25	198.4	106.0	85	251.4	134.3
46	40.6	21.7	06	93.5	49.9	66	146.4	78.2	26	199.3	106.5	86	252.3	134.8
47	41.5	22.1	07	94.4	50.4	67	147.3	78.7	27	200.2	107.0	87	253.1	135.2
48	42.3	22.6	08	95.3	50.9	68	148.2	79.2	28	201.1	107.4	88	254.0	135.7
49	43.2	23.1	09	96.1	51.4	69	149.1	79.6	29	202.0	107.9	89	254.9	136.2
50	44.1	23.6	10	97.0	51.8	70	149.9	80.1	30	202.9	108.4	90	255.8	136.6
51	45.0	24.0	111	97.9	52.3	171	150.8	80.6	231	203.7	108.8	291	256.7	137.1
52	45.9	24.5	12	98.8	52.8	72	151.7	81.0	32	204.6	109.3	92	257.5	137.6
53	46.7	25.0	13	99.7	53.2	73	152.6	81.5	33	205.5	109.8	93	258.4	138.1
54	47.6	25.4	14	100.5	53.7	74	153.5	82.0	34	206.4	110.3	94	259.3	138.5
55	48.5	25.9	15	101.4	54.2	75	154.3	82.5	35	207.3	110.7	95	260.2	139.0
56	49.4	26.4	16	102.3	54.7	76	155.2	82.9	36	208.2	111.2	96	261.1	139.5
57	50.3	26.9	17	103.2	55.1	77	156.1	83.4	37	209.0	111.7	97	262.0	139.9
58	51.2	27.3	18	104.1	55.6	78	157.0	83.9	38	209.9	112.1	98	262.8	140.4
59	52.0	27.8	19	105.0	56.1	79	157.9	84.3	39	210.8	112.6	99	263.7	140.9
60	52.9	28.3	20	105.8	56.5	80	158.8	84.8	40	211.7	113.1	300	264.6	141.4
Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.

for 5 ½ Points.

Difference of Latitude and Departure for 2 ¾ Points

Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.
1	00.9	00.6	61	52.3	31.4	121	103.8	62.2	181	155.2	93.0	241	206.7	123.9
2	01.7	01.0	62	53.2	31.9	22	104.6	62.7	82	156.1	93.5	42	207.6	124.4
3	02.6	01.5	63	54.0	32.4	23	105.5	63.2	83	157.0	94.0	43	208.4	124.9
4	03.4	02.1	64	54.9	32.9	24	106.4	63.7	84	157.8	94.6	44	209.3	125.4
5	04.3	02.6	65	55.8	33.4	25	107.2	64.2	85	158.7	95.1	45	210.1	125.9
6	05.1	03.1	66	56.6	33.9	26	108.1	64.8	86	159.5	95.6	46	211.0	126.4
7	06.0	03.6	67	57.5	34.4	27	108.9	65.3	87	160.4	96.1	47	211.9	126.9
8	06.9	04.1	68	58.3	35.0	28	109.8	65.8	88	161.2	96.6	48	212.7	127.4
9	07.7	04.6	69	59.2	35.5	29	110.6	66.3	89	162.1	97.1	49	213.6	128.0
10	08.6	05.1	70	60.0	36.0	30	111.5	66.8	90	163.0	97.6	50	214.4	128.5
11	09.4	05.7	71	60.9	36.5	131	112.4	67.3	191	163.8	98.2	251	215.3	129.0
12	10.3	06.2	72	61.8	37.0	32	113.2	67.8	92	164.7	98.7	52	216.1	129.5
13	11.2	06.7	73	62.6	37.6	33	114.1	68.4	93	165.5	99.2	53	217.0	130.0
14	12.0	07.2	74	63.5	38.0	34	114.9	68.9	94	166.4	99.7	54	217.9	130.5
15	12.5	07.7	75	64.3	38.6	35	115.8	69.4	95	167.3	100.2	55	218.7	131.0
16	13.7	08.2	76	65.2	39.1	36	116.6	69.9	96	168.1	100.7	56	219.6	131.1
17	14.6	08.7	77	66.0	39.6	37	117.5	70.4	97	169.0	101.2	57	220.4	132.1
18	15.4	09.3	78	66.9	40.1	38	118.4	70.9	98	169.8	101.8	58	221.0	132.6
19	16.3	09.8	79	67.8	40.6	39	119.2	71.4	99	170.7	102.3	59	222.1	133.1
20	17.2	10.3	80	68.6	41.1	40	120.1	72.0	200	171.5	102.8	60	223.0	133.6
21	18.0	10.8	81	69.5	41.6	141	120.9	72.5	201	172.4	103.3	261	223.9	134.1
22	18.9	11.3	82	70.3	42.2	42	121.8	73.0	02	173.3	103.8	62	224.7	134.6
23	19.7	11.8	83	71.2	42.7	43	122.7	73.5	03	174.1	104.3	63	225.6	135.2
24	20.6	12.3	84	72.0	43.2	44	123.5	74.0	04	175.0	104.8	64	226.4	135.7
25	21.4	12.9	85	72.9	43.7	45	124.4	74.6	05	175.8	105.4	65	227.3	136.2
26	22.3	13.4	86	73.8	44.2	46	125.2	75.0	06	176.7	105.9	66	228.1	136.7
27	23.2	13.9	87	74.6	44.7	47	126.1	75.6	07	177.5	106.4	67	229.0	137.2
28	24.0	14.4	88	75.5	45.2	48	126.9	76.1	08	178.4	106.9	68	229.9	137.7
29	24.9	14.9	89	76.3	45.7	49	127.8	76.6	09	179.3	107.4	69	230.7	138.2
30	25.7	15.4	90	77.2	46.3	50	128.7	77.1	10	180.1	107.9	70	231.6	138.8
31	26.6	15.9	91	78.1	46.8	151	129.5	77.6	211	181.0	108.4	271	232.4	139.3
32	27.4	16.4	92	78.9	47.3	52	130.4	78.1	12	181.8	109.0	72	233.3	139.8
33	28.3	17.0	93	79.8	47.8	53	131.2	78.6	13	182.7	109.5	73	234.2	140.3
34	29.2	17.5	94	80.6	48.3	54	132.1	79.1	14	183.5	110.0	74	235.0	140.8
35	30.0	18.0	95	81.5	48.8	55	132.9	79.7	15	184.4	110.5	75	235.9	141.3
36	30.9	18.5	96	82.3	49.3	56	133.8	80.2	16	185.3	111.0	76	236.7	141.8
37	31.7	19.0	97	83.2	49.9	57	134.7	80.7	17	186.1	111.6	77	237.6	142.4
38	32.6	19.5	98	84.1	50.4	58	135.5	81.2	18	187.0	112.0	78	238.4	142.9
39	33.5	20.0	99	84.9	50.9	59	136.4	81.7	19	187.8	112.6	79	239.3	143.4
40	34.3	20.6	100	85.8	51.4	60	137.2	82.2	20	188.7	113.1	80	240.2	143.9
41	35.2	21.1	101	86.6	51.9	161	138.1	82.7	221	189.6	113.6	281	241.0	144.4
42	36.0	21.6	02	87.5	52.4	62	138.9	83.3	22	190.4	114.1	82	241.9	144.9
43	36.9	22.9	03	88.3	52.9	63	139.8	83.8	23	191.3	114.6	83	242.7	145.4
44	37.7	22.6	04	89.2	53.4	64	140.7	84.3	24	192.1	115.1	84	243.6	146.0
45	38.6	23.1	05	90.1	54.0	65	141.5	84.8	25	193.0	115.6	85	244.4	146.5
46	39.5	23.6	06	90.9	54.5	66	142.4	85.3	26	193.8	116.1	86	245.3	147.0
47	40.3	24.2	07	91.8	55.0	67	143.2	85.8	27	194.7	116.7	87	246.2	147.5
48	41.2	24.7	08	92.6	55.5	68	144.1	86.3	28	195.6	117.2	88	247.0	148.0
49	42.0	25.2	09	93.5	56.0	69	145.0	86.9	29	196.4	117.7	89	247.9	148.6
50	42.9	25.7	10	94.3	56.5	70	145.8	87.4	30	197.3	118.2	90	248.7	149.0
51	43.7	26.2	111	95.2	57.0	171	146.7	87.9	231	198.1	118.7	291	249.6	149.6
52	44.6	26.7	12	96.1	57.6	72	147.5	88.4	32	199.0	119.2	92	250.4	150.1
53	45.5	27.2	13	96.9	58.1	73	148.4	88.9	33	199.8	119.7	93	251.3	150.6
54	46.3	27.8	14	97.8	58.6	74	149.2	89.4	34	200.7	120.3	94	252.2	151.1
55	47.2	28.3	15	98.6	59.1	75	150.1	89.9	35	201.6	120.8	95	253.0	151.6
56	48.0	28.8	16	99.5	59.6	76	151.0	90.4	36	202.4	121.3	96	253.9	152.1
57	48.9	29.3	17	100.4	60.1	77	151.8	91.0	37	203.3	121.8	97	254.7	152.6
58	49.7	29.8	18	101.2	60.6	78	152.7	91.5	38	204.1	122.3	98	255.6	153.1
59	50.6	30.3	19	102.1	61.2	79	153.5	92.0	39	205.0	122.8	99	256.5	153.8
60	51.5	30.8	20	102.9	61.7	80	154.4	92.5	40	205.8	123.3	300	257.3	154.2
Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.

for 5 ¼ Points

Difference of Latitude and Departure for 3 Points.

Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep
1	00.8	00.6	61	50.7	33.9	121	100.6	67.2	181	150.5	100.5	241	200.4	133.9
2	01.7	01.1	62	51.5	34.4	22	101.4	67.8	82	151.3	101.1	42	201.2	134.4
3	02.5	01.7	63	52.4	35.0	23	102.3	68.3	83	152.1	101.7	43	202.0	135.0
4	03.3	02.2	64	53.2	35.6	24	103.1	68.9	84	153.0	102.2	44	202.8	135.5
5	04.2	02.8	65	54.0	36.1	25	103.9	69.4	85	153.8	102.8	45	203.7	136.1
6	05.0	03.3	66	54.9	36.7	26	104.8	70.0	86	154.6	103.3	46	204.5	136.7
7	05.8	03.9	67	55.7	37.2	27	105.6	70.5	87	155.5	103.9	47	205.3	137.2
8	06.7	04.4	68	56.5	37.8	28	106.4	71.1	88	156.3	104.4	48	206.2	137.8
9	07.5	05.0	69	57.4	38.3	29	107.2	71.7	89	157.1	105.0	49	207.0	138.3
10	08.3	05.6	70	58.2	38.9	30	108.1	72.2	90	158.0	105.5	50	207.8	138.9
11	09.1	06.1	71	59.0	39.4	131	108.9	72.8	191	158.8	106.1	251	208.7	139.4
12	10.0	06.7	72	59.9	40.0	32	109.7	73.3	92	159.6	106.7	52	209.5	140.0
13	10.8	07.2	73	60.7	40.6	33	110.6	73.9	93	160.4	107.2	53	210.3	140.5
14	11.6	07.8	74	61.5	41.1	34	111.4	74.4	94	161.3	107.8	54	211.2	141.1
15	12.5	08.3	75	62.4	41.7	35	112.2	75.0	95	162.1	108.3	55	212.0	141.7
16	13.3	08.9	76	63.2	42.2	36	113.1	75.5	96	162.9	108.9	56	212.8	142.2
17	14.1	09.4	77	64.0	42.8	37	113.9	76.1	97	163.8	109.4	57	213.7	142.8
18	15.0	10.0	78	64.8	43.3	38	114.7	76.7	98	164.6	110.0	58	214.5	143.3
19	15.8	10.6	79	65.7	43.9	39	115.6	77.2	99	165.4	110.5	59	215.3	143.9
20	16.6	11.1	80	66.5	44.4	40	116.4	77.8	200	166.3	111.1	60	216.1	144.4
21	17.5	11.7	81	67.3	45.0	141	117.2	78.3	201	167.1	111.7	261	217.0	145.0
22	18.3	12.2	82	68.2	45.6	42	118.1	78.9	02	167.9	112.2	62	217.8	145.5
23	19.1	12.8	83	69.0	46.1	43	118.9	79.4	03	168.8	112.8	63	218.6	146.1
24	20.0	13.3	84	69.8	46.7	44	119.7	80.0	04	169.6	113.3	64	219.5	146.7
25	20.8	13.9	85	70.7	47.2	45	120.5	80.5	05	170.4	113.9	65	220.3	147.2
26	21.6	14.4	86	71.5	47.8	46	121.4	81.1	06	171.3	114.4	66	221.1	147.8
27	22.4	15.0	87	72.3	48.3	47	122.2	81.7	07	172.1	115.0	67	222.0	148.3
28	23.3	15.6	88	73.2	48.9	48	123.0	82.2	08	172.9	115.5	68	222.8	148.9
29	24.1	16.1	89	74.0	49.4	49	123.9	82.8	09	173.8	116.1	69	223.6	149.4
30	24.9	16.7	90	74.8	50.9	50	124.7	83.3	10	174.6	116.7	70	224.5	150.0
31	25.8	17.2	91	75.7	50.6	151	125.5	83.9	211	175.4	117.2	271	225.3	150.5
32	26.6	17.8	92	76.5	51.1	52	126.4	84.4	12	176.2	117.8	72	226.1	151.1
33	27.4	18.3	93	77.3	51.7	53	127.2	85.0	13	177.1	118.3	73	227.0	151.7
34	28.3	18.9	94	78.1	52.2	54	128.0	85.5	14	177.9	118.9	74	227.8	152.2
35	29.1	19.4	95	79.0	52.8	55	128.9	86.1	15	178.7	119.4	75	228.6	152.8
36	29.9	20.0	96	79.8	53.3	56	129.7	86.7	16	179.6	120.0	76	229.4	153.3
37	30.8	20.6	97	80.6	53.9	57	130.5	87.2	17	180.4	120.5	77	230.0	153.9
38	31.6	21.1	98	81.5	54.4	58	131.4	87.8	18	181.2	121.1	78	231.1	154.4
39	32.4	21.7	99	82.3	55.0	59	132.2	88.3	19	182.1	121.7	79	231.9	155.0
40	33.3	22.2	100	83.1	55.6	60	133.0	88.9	20	182.9	122.2	80	232.8	155.5
41	34.1	22.8	101	84.0	56.1	161	133.8	89.4	221	183.7	122.8	281	233.6	156.1
42	34.9	23.3	02	84.8	56.7	62	134.7	90.0	22	184.6	123.3	82	234.4	156.7
43	35.8	23.9	03	85.6	57.2	63	135.5	90.5	23	185.4	123.9	83	235.3	157.2
44	36.6	24.4	04	86.5	57.8	64	136.3	91.1	24	186.2	124.4	84	236.1	157.8
45	37.4	25.0	05	87.3	58.3	65	137.2	91.7	25	187.1	125.0	85	236.9	158.3
46	38.2	25.6	06	88.1	58.9	66	138.0	92.2	26	187.9	125.5	86	237.8	158.9
47	39.1	26.1	07	89.0	59.4	67	138.8	92.8	27	188.7	126.1	87	238.6	159.4
48	39.9	26.7	08	89.8	60.0	68	139.7	93.3	28	189.5	126.7	88	239.4	160.0
49	40.7	27.2	09	90.6	60.5	69	140.5	93.9	29	190.4	127.2	89	240.3	160.5
50	41.6	27.8	10	91.4	61.1	70	141.3	94.4	30	191.2	127.8	90	241.1	161.1
51	42.4	28.3	111	92.3	61.7	171	142.2	95.0	231	192.0	128.3	291	242.9	161.7
52	43.2	28.9	12	93.1	62.2	72	143.0	95.5	32	192.9	128.9	92	243.8	162.2
53	44.1	29.4	13	93.9	62.8	73	143.8	96.1	33	193.7	129.4	93	243.6	162.8
54	44.9	30.0	14	94.8	63.3	74	144.7	96.7	34	194.5	130.0	94	244.4	163.3
55	45.7	30.6	15	95.6	63.9	75	145.5	97.2	35	195.4	130.5	95	245.2	163.9
56	46.6	31.1	16	96.4	64.4	76	146.3	97.8	36	196.2	131.1	96	246.1	164.4
57	47.4	31.7	17	97.3	65.0	77	147.1	98.3	37	197.0	131.7	97	246.9	165.0
58	48.2	32.2	18	98.1	65.5	78	148.0	98.9	38	197.9	132.2	98	247.7	165.5
59	49.1	32.8	19	98.9	66.1	79	148.8	99.4	39	198.7	132.8	99	248.5	166.1
60	49.9	33.3	20	99.8	66.7	80	149.6	100.0	40	199.5	133.3	300	249.4	166.7
Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep	Lat.	Dist	Dep.	Lat.

for 5 Points.

Difference of Latitude and Departure for 3¼ Points.

Dift	Lat.	Dep.	Dift	Lat.	Dep.	Dift	Lat.	Dep.	Dift	Lat.	Dep.	Dift	Lat.	Dep.
1	00.8	00.6	61	49.0	36.3	121	97.2	72.1	181	145.4	107.8	241	193.5	143.6
2	01.6	01.2	62	49.8	36.9	22	98.0	72.7	82	146.2	108.4	42	194.3	144.2
3	02.4	01.8	63	50.6	37.5	23	98.8	73.3	83	147.0	109.0	43	195.1	144.8
4	03.2	02.4	64	51.4	38.1	24	99.6	73.9	84	147.8	109.6	44	195.9	145.4
5	04.0	03.0	65	52.2	38.7	25	100.4	74.5	85	148.6	110.2	45	196.7	146.0
6	04.8	03.6	66	53.0	39.3	26	101.2	75.1	86	149.4	110.8	46	197.5	146.6
7	05.6	04.2	67	53.8	39.9	27	102.0	75.7	87	150.2	111.4	47	198.4	147.1
8	06.4	04.8	68	54.6	40.5	28	102.8	76.3	88	151.0	112.0	48	199.2	147.7
9	07.2	05.4	69	55.4	41.1	29	103.6	76.9	89	151.8	112.6	49	200.0	148.3
10	08.0	06.0	70	56.2	41.7	30	104.4	77.4	90	152.6	113.2	50	200.8	148.9
11	08.8	06.6	71	57.0	42.3	131	105.2	78.0	191	153.4	113.8	251	201.6	149.5
12	09.6	07.1	72	57.8	42.9	32	106.0	78.6	92	154.2	114.4	52	202.4	150.1
13	10.4	07.7	73	58.6	43.5	33	106.8	79.2	93	155.0	115.0	53	203.2	150.7
14	11.2	08.3	74	59.4	44.1	34	107.6	79.8	94	155.8	115.6	54	204.0	151.3
15	12.0	08.9	75	60.2	44.7	35	108.4	80.4	95	156.6	116.2	55	204.8	151.9
16	12.8	09.5	76	61.0	45.3	36	109.2	81.0	96	157.4	116.8	56	205.6	152.5
17	13.7	10.1	77	61.8	45.9	37	110.0	81.6	97	158.2	117.4	57	206.4	153.1
18	14.5	10.7	78	62.6	46.5	38	110.8	82.2	98	159.0	118.0	58	207.2	153.7
19	15.3	11.3	79	63.4	47.1	39	111.6	82.8	99	159.8	118.6	59	208.0	154.3
20	16.1	11.9	80	64.2	47.7	40	112.4	83.4	200	160.6	119.1	60	208.8	154.9
21	16.9	12.5	81	65.0	48.3	141	113.2	84.0	201	161.4	119.7	261	209.6	155.5
22	17.7	13.1	82	65.8	48.9	42	114.0	84.6	02	162.2	120.3	62	210.4	156.1
23	18.5	13.7	83	66.7	49.4	43	114.8	85.2	03	163.0	120.9	63	211.2	156.7
24	19.3	14.3	84	67.5	50.0	44	115.6	85.8	04	163.8	121.5	64	212.0	157.3
25	20.1	14.9	85	68.3	50.6	45	116.4	86.4	05	164.6	122.1	65	212.8	157.9
26	20.9	15.5	86	69.1	51.2	46	117.2	87.0	06	165.4	122.7	66	213.6	158.5
27	21.7	16.1	87	69.9	51.8	47	118.0	87.6	07	166.2	123.3	67	214.4	159.1
28	22.5	16.7	88	70.7	52.4	48	118.8	88.2	08	167.0	123.9	68	215.2	159.7
29	23.3	17.3	89	71.5	53.0	49	119.7	88.8	09	167.8	124.5	69	216.0	160.3
30	24.1	17.9	90	72.3	53.6	50	120.5	89.4	10	168.6	125.1	70	216.8	160.9
31	24.9	18.5	91	73.1	54.2	151	121.3	90.0	211	169.4	125.7	271	217.6	161.4
32	25.7	19.1	92	73.9	54.8	52	122.1	90.6	12	170.2	126.3	72	218.4	162.0
33	26.5	19.7	93	74.7	55.4	53	122.9	91.1	13	171.0	126.9	73	219.2	161.6
34	27.3	20.3	94	75.5	56.0	54	123.7	91.7	14	171.8	127.5	74	220.0	163.2
35	28.1	20.9	95	76.3	56.6	55	124.5	92.3	15	172.7	128.1	75	220.8	163.8
36	28.9	21.4	96	77.1	57.2	56	125.3	92.9	16	173.5	128.7	76	221.6	164.4
37	29.7	22.0	97	77.9	57.8	57	126.1	93.5	17	174.3	129.3	77	222.4	165.0
38	30.5	22.6	98	78.7	58.4	58	126.9	94.1	18	175.1	129.9	78	223.2	165.6
39	31.3	23.2	99	79.5	59.0	59	127.7	94.7	19	175.9	130.5	79	224.0	166.2
40	32.1	23.8	100	80.3	59.6	60	128.5	95.3	20	176.7	131.1	80	224.8	166.8
41	32.9	24.4	101	81.1	60.2	161	129.3	95.9	221	177.5	131.7	281	225.7	167.4
42	33.7	25.0	02	81.9	60.8	62	130.1	96.5	22	178.3	132.3	82	226.5	168.0
43	34.5	25.6	03	82.7	61.4	63	130.9	97.1	23	179.1	132.9	83	227.3	168.6
44	35.3	26.2	04	83.5	62.0	64	131.7	97.7	24	179.9	133.4	84	228.1	169.2
45	36.1	26.8	05	84.3	62.6	65	132.5	98.3	25	180.7	134.0	85	228.9	169.8
46	36.9	27.4	06	85.1	63.1	66	133.3	98.9	26	181.5	134.6	86	229.7	170.4
47	37.7	28.0	07	85.9	63.7	67	134.1	99.5	27	182.3	135.2	87	230.5	171.0
48	38.5	28.6	08	86.7	64.3	68	134.9	100.1	28	183.1	135.8	88	231.3	171.6
49	39.3	29.2	09	87.5	64.9	69	135.7	100.7	29	183.9	136.4	89	232.1	172.2
50	40.2	29.8	10	88.3	65.5	70	136.5	101.3	30	184.7	137.0	90	232.9	172.8
51	41.0	30.4	111	89.1	66.1	171	137.3	101.9	231	185.5	137.6	291	233.7	173.4
52	41.8	31.0	12	89.9	66.7	72	138.1	102.5	32	186.3	138.2	92	234.5	174.0
53	42.6	31.6	13	90.7	67.3	73	138.9	103.1	33	187.1	138.8	93	235.3	174.6
54	43.4	32.2	14	91.5	67.9	74	139.7	103.7	34	187.9	139.4	94	236.1	175.1
55	44.2	32.8	15	92.4	68.5	75	140.5	104.3	35	188.7	140.0	95	236.9	175.7
56	45.0	33.4	16	93.2	69.1	76	141.3	104.9	36	189.5	140.6	96	237.7	176.3
57	45.8	34.0	17	94.0	69.7	77	142.1	105.4	37	190.3	141.2	97	238.5	176.9
58	46.6	34.6	18	94.8	70.3	78	142.9	106.0	38	191.1	141.8	98	239.3	177.5
59	47.1	35.1	19	95.6	70.9	79	143.7	106.6	39	191.9	142.4	99	240.1	178.1
60	48.2	35.7	20	96.4	71.5	80	144.5	107.2	40	192.7	143.0	300	240.9	178.7
Dift	Dep.	Lat.	Dift	Dep.	Lat.	Dift	Dep.	Lat.	Dift	Dep.	Lat.	Dift	Dep.	Lat.

for 4¾ Points.

Difference of Latitude and Departure for 3 ½ Points.

Dift	Lat.	Dep.	Dift	Lat.	Dep.	Dift	Lat.	Dep.	Dift	Lat.	Dep.	Dift	Lat.	Dep.
1	00.8	00.6	61	47.1	38.7	121	93.5	76.7	181	139.9	114.8	241	186.2	152.8
2	01.5	01.3	62	47.9	39.3	22	94.3	77.4	82	140.6	115.4	42	187.0	153.5
3	02.3	01.9	63	48.7	40.0	23	95.1	78.0	83	141.4	116.0	43	187.8	154.1
4	03.1	02.5	64	49.5	40.6	24	95.8	78.6	84	142.2	116.7	44	188.6	154.7
5	03.9	03.2	65	50.2	41.2	25	96.6	79.3	85	143.0	117.3	45	189.3	155.4
6	04.6	03.8	66	51.0	41.9	26	97.4	79.9	86	143.7	118.0	46	190.1	156.0
7	05.4	04.4	67	51.8	42.5	27	98.1	80.5	87	144.5	118.6	47	190.9	156.6
8	06.2	05.1	68	52.6	43.1	28	98.9	81.2	88	145.3	119.2	48	191.6	157.3
9	07.0	05.7	69	53.3	43.8	29	99.7	81.8	89	146.1	119.9	49	192.4	157.9
10	07.7	06.3	70	54.1	44.4	30	100.5	82.4	90	146.8	120.5	50	193.2	158.5
11	08.5	07.0	71	54.9	45.0	131	101.2	83.1	191	147.6	121.1	251	194.0	159.2
12	09.3	07.6	72	55.6	45.7	32	102.0	83.7	92	148.4	121.8	52	194.7	159.8
13	10.1	08.2	73	56.4	46.3	33	102.8	84.3	93	149.1	122.4	53	195.5	160.4
14	10.8	08.9	74	57.2	46.9	34	103.6	85.0	94	149.9	123.0	54	196.3	161.1
15	11.6	09.5	75	58.0	47.6	35	104.3	85.6	95	150.7	123.7	55	197.1	161.7
16	12.4	10.1	76	58.7	48.2	36	105.1	86.2	96	151.8	124.3	56	197.8	162.3
17	13.1	10.8	77	59.5	48.8	37	105.9	86.9	97	152.2	124.9	57	198.6	163.0
18	13.9	11.4	78	60.3	49.5	38	106.6	87.5	98	153.0	125.6	58	199.4	163.6
19	14.7	12.0	79	61.1	50.1	39	107.4	88.1	99	153.8	126.2	59	200.1	164.1
20	15.5	12.7	80	61.8	50.7	40	108.2	88.8	200	154.6	126.8	60	200.9	164.9
21	16.2	13.3	81	62.6	51.4	141	109.0	89.4	201	155.3	127.5	261	201.7	165.5
22	17.0	14.0	82	63.4	52.0	42	109.7	90.0	02	156.1	128.1	62	202.5	166.1
23	17.8	14.6	83	64.1	52.6	43	110.5	90.7	03	156.9	128.7	63	203.2	166.8
24	18.5	15.2	84	64.9	53.3	44	111.3	91.3	04	157.6	129.4	64	204.0	167.4
25	19.3	15.9	85	65.7	53.9	45	112.1	92.0	05	158.4	130.0	65	204.8	168.0
26	20.1	16.5	86	66.5	54.5	46	112.8	92.6	06	159.2	130.6	66	205.6	168.7
27	20.9	17.1	87	67.2	55.2	47	113.6	93.2	07	160.0	131.3	67	206.3	169.3
28	21.6	17.8	88	68.0	55.8	48	114.4	93.9	08	160.7	131.9	68	207.1	170.0
29	22.4	18.4	89	68.8	56.4	49	115.1	94.5	09	161.5	132.5	69	207.9	170.7
30	23.2	19.0	90	69.6	57.1	50	115.9	95.1	10	162.3	133.2	70	208.6	171.2
31	24.0	19.7	91	70.3	57.7	151	116.7	95.8	211	163.1	133.8	271	209.4	171.9
32	24.7	20.3	92	71.1	58.3	52	117.5	96.4	12	163.8	134.4	72	210.2	172.5
33	25.5	20.9	93	71.9	59.0	53	118.2	97.0	13	164.6	135.1	73	211.0	173.1
34	26.3	21.6	94	72.6	59.6	54	119.0	97.7	14	165.4	135.7	74	211.7	173.8
35	27.1	22.2	95	73.4	60.2	55	119.8	98.3	15	166.1	136.3	75	212.5	174.4
36	27.8	22.8	96	74.2	60.9	56	120.6	98.9	16	166.9	137.0	76	213.3	175.0
37	28.6	23.5	97	75.0	61.5	57	121.3	99.6	17	167.7	137.6	77	214.1	175.7
38	29.4	24.1	98	75.7	62.1	58	122.1	100.2	18	168.5	138.2	78	214.8	176.3
39	30.1	24.7	99	76.5	62.8	59	122.9	100.8	19	169.2	138.9	79	215.6	176.9
40	30.9	25.4	100	77.3	63.4	60	123.6	101.5	20	170.0	139.5	80	216.4	177.6
41	31.7	26.0	101	78.1	64.0	161	124.4	102.1	221	170.8	140.1	281	217.1	178.2
42	32.5	26.6	02	78.8	64.7	62	125.2	102.7	22	171.6	140.8	82	217.9	178.8
43	33.2	27.3	03	79.6	65.3	63	126.0	103.4	23	172.3	141.4	83	218.7	179.5
44	34.0	27.9	04	80.4	66.0	64	126.7	104.0	24	173.1	142.0	84	219.5	180.1
45	34.8	28.5	05	81.1	66.6	65	127.5	104.6	25	173.9	142.7	85	220.2	180.7
46	35.6	29.2	06	81.9	67.2	66	128.3	105.3	26	174.6	143.3	86	221.0	181.4
47	36.3	29.8	07	82.7	67.9	67	129.1	105.9	27	175.4	144.0	87	221.8	182.0
48	37.1	30.4	08	83.5	68.5	68	129.8	106.5	28	176.2	144.6	88	222.6	182.6
49	37.9	31.1	09	84.2	69.1	69	130.6	107.2	29	177.0	145.2	89	223.3	183.3
50	38.6	31.7	10	85.0	69.8	70	131.4	107.8	30	177.7	145.9	90	224.1	183.0
51	39.4	32.3	111	85.8	70.4	171	132.1	108.4	231	178.5	146.5	291	224.9	184.5
52	40.2	33.0	12	86.6	71.0	72	132.9	109.1	32	179.3	147.1	92	225.6	185.2
53	41.0	33.6	13	87.3	71.7	73	133.7	109.7	33	180.1	147.8	93	226.4	185.8
54	42.7	34.2	14	88.1	72.3	74	134.5	110.3	34	180.8	148.4	94	227.2	186.4
55	42.5	34.9	15	88.9	72.9	75	135.2	111.0	35	181.6	149.0	95	228.0	187.1
56	43.3	35.5	16	89.6	73.6	76	136.0	111.6	36	182.4	149.7	96	228.7	187.7
57	44.1	36.1	17	90.4	74.2	77	136.8	112.2	37	183.1	150.3	97	229.5	188.3
58	44.8	36.8	18	91.2	74.8	78	137.6	112.9	38	183.9	150.9	98	230.3	189.0
59	45.6	37.4	19	92.0	75.5	79	138.3	113.5	39	184.7	151.6	99	231.1	189.6
60	46.4	38.0	20	92.7	76.3	80	139.1	114.1	40	185.5	152.2	300	231.8	190.2
Dift	Dep.	Lat.	Dift	Dep.	Lat.	Dift	Dep.	Lat.	Dift	Dep.	Lat.	Dift	Dep.	Lat.

for 4 ½ Points.

Difference of Latitude and Departure for 3 ¾ Points.

Dift	Lat.	Dep.	Dift	Lat.	Dep.	Dift	Lat.	Dep.	Dift	Lat.	Dep.	Dift	Lat.	Dep.
1	00.7	00.7	61	45.2	41.0	121	89.6	81.2	181	134.1	121.5	241	178.5	161.8
2	01.5	01.3	62	45.9	41.6	22	90.4	81.9	82	134.8	122.2	42	179.3	162.5
3	02.2	02.0	63	46.7	42.3	23	91.1	82.6	83	135.6	122.9	43	180.0	163.2
4	03.0	02.7	64	47.4	43.0	24	91.9	83.3	84	136.3	123.5	44	180.7	163.3
5	03.7	03.4	65	48.2	43.6	25	92.6	83.9	85	137.0	124.2	45	181.5	164.5
6	04.4	04.0	66	48.9	44.3	26	93.3	84.6	86	137.8	124.9	46	182.2	165.2
7	05.2	04.7	67	49.6	45.0	27	94.1	85.3	87	138.5	125.6	47	183.0	165.8
8	05.9	05.4	68	50.4	45.7	28	94.8	85.9	88	139.3	126.2	48	183.7	166.5
9	06.7	06.0	69	51.1	46.3	29	95.6	86.6	89	140.0	126.9	49	184.4	167.2
10	07.4	06.7	70	51.9	47.0	30	96.3	87.3	90	140.7	127.6	50	185.2	167.9
11	08.2	07.4	71	52.6	47.7	131	97.0	88.0	191	141.5	128.2	251	185.9	168.5
12	08.9	08.1	72	53.3	48.3	32	97.8	88.6	92	142.2	128.9	52	186.7	169.2
13	09.6	08.7	73	54.1	49.0	33	98.5	89.3	93	143.0	129.6	53	187.4	169.9
14	10.4	09.4	74	54.8	49.7	34	99.3	90.0	94	143.7	130.3	54	188.2	170.5
15	11.1	10.1	75	55.6	50.4	35	100.0	90.6	95	144.4	130.9	55	188.9	171.2
16	11.9	10.7	76	56.3	51.0	36	100.7	91.3	96	145.2	131.6	56	189.6	171.9
17	12.6	11.4	77	57.0	51.7	37	101.5	92.0	97	145.9	132.3	57	190.4	172.6
18	13.3	12.1	78	57.8	52.4	38	102.2	92.7	98	146.7	132.9	58	191.1	173.2
19	14.1	12.8	79	58.5	53.0	39	103.0	93.3	99	147.4	133.6	59	191.9	173.9
20	14.8	13.4	80	59.3	53.7	40	103.7	94.0	200	148.2	134.3	60	192.6	174.6
21	15.6	14.1	81	60.0	54.4	141	104.4	94.7	201	148.9	135.0	261	193.3	175.2
22	16.3	14.8	82	60.7	55.1	42	105.2	95.3	02	149.6	135.6	62	194.1	175.9
23	17.0	15.4	83	61.5	55.9	43	105.9	96.0	03	150.4	136.3	63	194.8	176.6
24	17.8	16.1	84	62.2	56.4	44	106.7	96.7	04	151.1	137.0	64	195.6	177.3
25	18.5	16.8	85	63.0	57.1	45	107.4	97.4	05	151.9	137.6	65	196.3	177.9
26	19.3	17.5	86	63.7	57.7	46	108.2	98.0	06	152.6	138.3	66	197.0	178.6
27	20.0	18.1	87	64.4	58.4	47	108.9	98.7	07	153.3	139.0	67	197.8	179.3
28	20.7	18.8	88	65.2	59.1	48	109.6	99.4	08	154.1	139.7	68	198.5	179.9
29	21.5	19.5	89	65.9	59.8	49	110.4	100.0	09	154.8	140.3	69	199.3	180.6
30	22.2	20.1	90	66.7	60.4	50	111.1	100.7	10	155.6	141.0	70	200.0	181.3
31	23.0	20.8	91	67.4	61.1	151	111.9	101.4	211	156.3	141.7	271	200.7	182.0
32	23.7	21.5	92	68.2	61.8	52	112.6	102.1	12	157.0	142.3	72	201.5	182.6
33	24.4	22.2	93	68.9	62.4	53	113.3	102.7	13	157.8	143.0	73	202.2	183.3
34	25.2	22.8	94	69.6	63.1	54	114.1	103.4	14	158.5	143.7	74	203.0	184.0
35	25.9	23.5	95	70.4	63.8	55	114.8	104.1	15	159.3	144.4	75	203.7	184.6
36	26.7	24.2	96	71.1	64.5	56	115.6	104.7	16	160.0	145.0	76	204.4	185.3
37	27.4	24.8	97	71.9	65.1	57	116.3	105.4	17	160.7	145.7	77	205.2	186.0
38	28.2	25.5	98	72.6	65.8	58	117.0	106.1	18	161.5	146.4	78	205.9	186.7
39	28.9	26.2	99	73.3	66.5	59	117.8	106.8	19	162.2	147.0	79	206.7	187.3
40	29.6	26.9	100	74.1	67.1	60	118.5	107.4	20	163.0	147.7	80	207.4	188.0
41	30.4	27.7	101	74.8	67.8	161	119.3	108.1	221	163.7	148.4	281	208.2	188.7
42	31.1	28.2	02	75.6	68.5	62	120.0	108.8	22	164.4	149.1	82	208.9	189.3
43	31.9	28.9	03	76.3	69.2	63	120.7	109.4	23	165.2	149.7	83	209.6	190.0
44	32.6	29.5	04	77.0	69.8	64	121.5	110.1	24	165.9	150.4	84	210.4	190.7
45	33.3	30.2	05	77.8	70.5	65	122.2	110.8	25	166.7	151.1	85	211.1	191.4
46	34.1	30.9	06	78.5	71.2	66	123.0	111.5	26	167.4	151.7	86	211.9	192.0
47	34.8	31.6	07	79.3	71.8	67	123.7	112.1	27	168.2	152.4	87	212.6	192.7
48	35.6	32.2	08	80.0	72.5	68	124.4	112.8	28	168.9	153.1	88	213.4	193.4
49	36.3	32.9	09	80.7	73.2	69	125.2	113.5	29	169.6	153.8	89	214.1	194.0
50	37.0	33.6	10	81.5	73.9	70	125.9	114.1	30	170.4	154.9	90	214.8	194.7
51	37.8	34.2	111	82.2	74.5	171	126.7	114.8	231	171.1	155.1	291	215.6	195.4
52	38.5	34.9	12	83.0	75.2	72	127.4	115.5	32	171.9	155.8	92	216.3	196.1
53	39.3	35.6	13	83.7	75.9	73	128.2	116.2	33	172.6	156.4	93	217.0	196.7
54	40.0	36.3	14	84.4	76.5	74	128.9	116.8	34	173.3	157.1	94	217.8	197.4
55	40.7	36.9	15	85.2	77.2	75	129.6	117.5	35	174.1	157.8	95	218.5	198.1
56	41.5	37.6	16	85.9	77.9	76	130.4	118.2	36	174.8	158.5	96	219.3	198.7
57	42.2	38.3	17	86.7	78.6	77	131.1	118.8	37	175.6	159.1	97	220.0	199.4
58	43.0	38.9	18	87.4	79.2	78	131.9	119.5	38	176.3	159.8	98	220.7	200.1
59	43.7	39.6	19	88.2	79.9	79	132.6	120.2	39	177.0	160.5	99	221.5	200.8
60	44.5	40.3	20	88.9	80.6	80	133.3	120.9	40	177.8	161.1	300	222.2	201.4
Dift	Dep.	Lat.	Dift	Dep.	Lat.	Dift	Dep.	Lat.	Dift	Dep.	Lat.	Dift	Dep.	Lat.

for 4 ¼ Point.

Difference of Latitude and Departure for 4 Points.

Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.
1	00.7	00.7	61	43.1	43.1	121	85.6	85.6	181	128.0	128.0	241	170.4	170.4
2	01.4	01.4	62	43.8	43.8	22	86.3	86.3	82	128.7	128.7	42	171.1	171.1
3	02.1	02.1	63	44.5	44.5	23	87.0	87.0	83	129.4	129.4	43	171.8	171.8
4	02.8	02.8	64	45.3	45.3	24	87.7	87.7	84	130.1	130.1	44	172.5	172.5
5	03.5	03.5	65	46.0	46.0	25	88.4	88.4	85	130.8	130.8	45	173.2	173.2
6	04.2	04.2	66	46.7	46.7	26	89.1	89.1	86	131.5	131.5	46	173.9	173.9
7	04.9	04.9	67	47.4	47.4	27	89.8	89.8	87	132.1	132.1	47	174.6	174.6
8	05.7	05.7	68	48.1	48.1	28	90.5	90.5	88	132.9	132.9	48	175.4	175.4
9	06.4	06.4	69	48.8	48.8	29	91.2	91.2	89	133.6	133.6	49	176.1	176.1
10	07.1	07.1	70	49.5	49.5	30	91.9	91.9	90	134.3	134.3	50	176.8	176.8
11	07.8	07.8	71	50.2	50.2	131	93.6	92.6	191	135.1	135.1	251	177.5	177.5
12	08.5	08.5	72	50.9	50.9	32	93.3	93.3	92	135.8	135.8	52	178.2	178.2
13	09.2	09.2	73	51.6	51.6	33	94.0	94.0	93	136.5	136.5	53	178.9	178.9
14	09.9	09.9	74	52.3	52.3	34	94.7	94.7	94	137.2	137.2	54	179.6	179.6
15	10.6	10.6	75	53.0	53.0	35	95.5	95.5	95	137.9	137.9	55	180.3	180.3
16	11.3	11.3	76	53.7	53.7	36	96.2	96.2	96	138.6	138.6	56	181.0	181.0
17	12.0	12.0	77	54.4	54.4	37	96.9	96.9	97	139.3	139.3	57	181.7	181.7
18	12.7	12.7	78	55.2	55.2	38	97.6	97.6	98	140.0	140.0	58	182.4	182.4
19	13.4	13.4	79	55.9	55.9	39	98.3	98.3	99	140.7	140.7	59	183.1	183.1
20	14.1	14.1	80	56.6	56.6	40	99.0	99.0	200	141.4	141.4	60	183.8	183.8
21	14.8	14.8	81	57.3	57.3	141	99.7	99.7	201	142.1	142.1	261	184.5	184.5
22	15.6	15.6	82	58.0	58.0	42	190.4	100.4	02	142.8	142.8	62	185.3	185.3
23	16.3	16.3	83	58.7	58.7	43	101.1	101.1	03	143.5	143.5	63	186.0	186.0
24	17.0	17.0	84	59.4	59.4	44	101.8	101.8	04	144.2	144.2	64	186.7	186.7
25	17.7	17.7	85	60.1	60.1	45	102.5	102.5	05	144.9	144.9	65	187.4	187.4
26	18.4	18.4	86	60.8	60.8	46	103.2	103.2	06	145.7	145.7	66	188.1	188.1
27	19.1	19.1	87	61.5	61.5	47	103.9	103.9	07	146.4	146.4	67	188.8	188.8
28	19.8	19.8	88	62.2	62.2	48	104.6	104.6	08	147.1	147.1	68	189.5	189.5
29	20.5	20.5	89	62.9	62.9	49	105.4	105.4	09	147.8	147.8	69	190.2	190.2
30	21.2	21.1	90	63.6	63.6	50	106.1	106.1	10	148.5	148.5	70	190.9	190.9
31	21.9	21.9	91	64.3	64.3	151	106.8	106.8	211	149.2	149.2	271	191.6	191.6
32	22.6	22.6	92	65.1	65.1	52	107.5	107.5	12	149.9	149.9	72	192.3	192.3
33	23.3	23.3	93	65.8	65.8	53	108.2	108.2	13	150.6	150.6	73	193.0	193.0
34	24.0	24.0	94	66.5	66.5	54	108.9	108.9	14	151.3	151.3	74	193.7	193.7
35	24.7	24.7	95	67.2	67.2	55	109.6	109.6	15	152.0	152.0	75	194.4	194.4
36	25.5	25.5	96	67.9	67.9	56	110.3	110.3	16	152.7	152.7	76	195.2	195.2
37	26.2	26.2	97	68.6	68.6	57	111.0	111.0	17	153.4	153.4	77	195.9	195.9
38	26.9	26.9	98	69.3	69.3	58	111.7	111.7	18	154.1	154.1	78	196.6	196.6
39	27.6	27.6	99	70.0	70.0	59	112.4	112.4	19	154.8	154.8	79	197.3	197.3
40	28.3	28.3	100	70.7	70.7	60	113.1	113.1	20	155.6	155.6	80	198.0	198.0
41	29.0	29.0	101	71.4	71.4	161	113.8	113.8	221	156.3	156.3	281	198.7	198.7
42	29.7	29.7	02	72.1	72.1	62	114.5	114.5	22	157.0	157.0	82	199.4	199.4
43	30.4	30.4	03	72.8	72.8	63	115.3	115.3	23	157.7	157.7	83	200.1	200.1
44	31.1	31.1	04	73.5	73.5	64	116.0	116.0	24	158.4	158.4	84	200.8	200.8
45	31.8	31.8	05	74.2	74.2	65	116.7	116.7	25	159.1	159.1	85	201.5	201.5
46	32.5	32.5	06	74.9	74.9	66	117.4	117.4	26	159.8	159.8	86	202.2	202.9
47	33.2	33.2	07	75.7	75.7	67	118.1	118.1	27	160.5	160.5	87	202.9	202.0
48	33.9	33.9	08	76.4	76.4	68	118.8	118.8	28	161.2	161.2	88	203.6	203.6
49	34.6	34.6	09	77.1	77.1	69	119.5	119.5	29	161.9	161.9	89	204.3	204.3
50	35.4	35.4	10	77.8	77.8	70	120.2	120.2	30	162.6	162.6	90	205.1	205.1
51	36.1	36.1	111	78.5	78.5	171	120.9	120.9	231	163.3	163.3	291	205.8	205.8
52	36.8	36.8	12	79.2	79.2	72	121.6	121.6	32	164.0	164.0	92	206.5	206.5
53	37.5	37.5	13	79.9	79.9	73	122.3	122.3	33	164.7	164.7	93	207.2	207.2
54	38.2	38.2	14	80.6	80.6	74	123.0	123.0	34	165.5	165.5	94	207.9	207.9
55	38.9	38.9	15	81.3	81.3	75	123.7	123.7	35	166.2	166.2	95	208.6	208.6
56	39.6	39.6	16	82.0	82.0	76	124.4	124.4	36	166.9	166.9	96	209.3	209.3
57	40.3	40.3	17	82.7	82.7	77	125.2	125.2	37	167.6	167.6	97	210.0	210.0
58	41.0	41.0	18	83.4	83.4	78	125.9	125.9	38	168.3	168.3	98	210.7	210.7
59	41.7	41.7	19	84.1	84.1	79	126.6	126.6	39	169.0	169.0	99	211.4	211.4
60	42.4	42.4	20	84.8	84.8	80	127.3	127.3	40	169.7	169.7	300	212.1	212.1
Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.

for 4 Points.

52=
19

Difference of Latitude and Departure for 1 Degree.

Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.
1	01.0	00.0	61	61.0	01.1	121	121.0	02.1	181	181.0	03.1	241	241.0	04.2
2	02.0	00.0	62	62.0	01.1	22	122.0	02.1	82	182.0	03.1	42	242.0	04.2
3	03.0	00.1	63	63.0	01.1	23	123.0	02.1	83	183.0	03.2	43	243.0	04.2
4	04.0	00.1	64	64.0	01.1	24	124.0	02.2	84	184.0	03.2	44	244.0	04.2
5	05.0	00.1	65	65.0	01.1	25	125.0	02.2	85	185.0	03.2	45	245.0	04.2
6	06.0	00.1	66	66.0	01.2	26	1 6.0	02.2	86	186.0	03.2	46	246.0	04.2
7	07.0	00.1	67	67.0	01.2	27	127.0	02.2	87	187.0	03.2	47	247.0	04.2
8	08.0	00.1	68	68.0	01.2	28	128.0	02.2	88	188.0	03.2	48	248.0	04.3
9	09.0	00.2	69	69.0	01.2	29	129.0	02.2	89	189.0	03.3	49	249.0	04.3
10	10.0	00.2	70	70.0	01.2	30	130.0	02.3	90	190.0	03.3	50	250.0	04.3
11	11.0	00.2	71	71.0	01.2	131	131.0	02.3	191	191.0	03.3	251	251.0	04.3
12	12.0	00.2	72	72.0	01.3	32	132.0	02.3	92	192.0	03.3	52	252.0	04.3
13	13.0	00.2	73	73.0	01.3	33	133.0	02.3	93	193.0	03.3	53	253.0	04.3
14	4.0	00.2	74	74.0	01.3	34	134.0	02.3	94	194.0	03.3	54	254.0	04.4
15	15.0	00.3	75	75.0	01.3	35	135.0	02.3	95	195.0	03.4	55	255.0	04.4
16	16.0	00.3	76	76.0	01.3	36	136.0	02.4	96	196.0	03.4	56	256.0	04.4
17	17.0	00.3	77	77.0	01.3	37	137.0	02.4	97	197.0	03.4	57	257.0	04.4
18	18.0	00.3	78	78.0	01.4	38	138.0	02.4	98	198.0	03.4	58	258.0	04.4
19	19.0	00.3	79	79.0	01.4	39	139.0	02.4	99	199.0	03.4	59	259.0	04.4
20	20.0	00.4	80	80.0	01.4	40	140.0	02.4	200	200.0	03.4	60	260.0	04.4
21	21.0	00.4	81	81.0	01.4	141	141.0	02.4	201	201.0	03.5	261	261.0	04.5
22	22.0	00.4	82	82.0	01.4	42	142.0	02.5	02	202.0	03.5	62	262.0	04.5
23	23.0	00.4	83	83.0	01.5	43	143.0	02.5	03	203.0	03.5	63	263.0	04.5
24	24.0	00.4	84	84.0	01.5	44	144.0	02.5	04	204.0	03.5	64	264.0	04.5
25	25.0	00.4	85	85.0	01.5	45	145.0	02.5	05	205.0	03.5	65	265.0	04.6
26	26.0	00.5	86	86.0	01.5	46	146.0	02.5	06	206.0	03.5	66	266.0	04.6
27	27.0	00.5	87	87.0	01.5	47	147.0	02.5	07	207.0	03.6	67	267.0	04.6
28	28.0	00.5	88	88.0	01.5	48	148.0	02.6	08	208.0	03.6	68	268.0	04.6
29	29.0	00.5	89	89.0	01.6	49	149.0	02.6	09	209.0	03.6	69	269.0	04.6
30	30.0	00.5	90	90.0	01.6	50	150.0	02.6	10	210.0	03.6	70	270.0	04.6
31	31.0	00.5	91	91.0	1.6	151	151.0	02.6	211	211.0	03.6	271	271.0	04.7
32	32.0	00.6	92	92.0	01.6	52	152.0	02.6	12	212.0	03.6	72	272.0	04.7
33	33.0	00.6	93	93.0	01.6	53	153.0	02.7	13	213.0	03.7	73	273.0	04.7
34	34.0	00.6	94	94.0	01.6	54	154.0	02.7	14	214.0	03.7	74	274.0	04.7
35	35.0	00.6	95	95.0	01.7	55	155.0	02.7	15	215.0	03.7	75	275.0	04.7
36	36.0	00.6	96	96.0	01.7	56	156.0	02.7	16	216.0	03.7	76	276.0	04.7
37	37.0	00.6	97	97.0	01.7	57	157.0	02.7	17	217.0	03.7	77	277.0	04.8
38	38.0	00.7	98	98.0	01.7	58	158.0	02.7	18	218.0	03.8	78	278.0	04.8
39	39.0	00.7	99	99.0	01.7	59	159.0	02.7	19	219.0	03.8	79	279.0	04.8
40	40.0	00.7	100	100.0	01.7	60	160.0	02.8	20	220.0	03.8	80	280.0	04.8
41	41.0	00.7	101	101.0	01.8	161	161.0	02.8	221	221.0	03.8	281	281.0	04.8
42	42.0	00.7	02	102.0	01.8	62	162.0	02.8	22	222.0	03.8	82	282.0	04.8
43	43.0	00.8	03	103.0	01.8	63	163.0	02.8	23	223.0	03.8	83	283.0	04.9
44	44.0	00.8	04	104.0	01.8	64	164.0	01.8	24	224.0	03.9	84	284.0	04.9
45	45.0	00.8	05	105.0	01.8	65	165.0	02.9	25	225.0	03.9	85	285.0	04.9
46	46.0	00.8	06	106.0	01.8	66	166.0	01.9	26	226.0	03.9	86	286.0	04.9
47	47.0	00.8	07	107.0	01.9	67	167.0	02.9	27	227.0	03.9	87	287.0	04.9
48	48.0	00.8	08	108.0	01.9	68	168.0	02.9	28	228.0	03.9	88	288.0	04.9
49	49.0	00.9	09	109.0	01.9	69	169.0	02.9	29	229.0	03.9	89	289.0	05.0
50	50.0	00.9	10	110.0	01.9	70	170.0	02.9	30	230.0	04.0	90	290.0	05.0
51	51.0	00.9	111	111.0	01.9	171	171.0	03.0	231	231.0	04.0	291	291.0	05.0
52	52.0	00.9	12	112.0	01.9	72	172.0	03.0	32	232.0	04.0	92	292.0	05.0
53	53.0	00.9	13	113.0	02.0	73	173.0	03.0	33	233.0	04.0	93	293.0	05.0
54	54.0	00.9	14	114.0	02.0	74	174.0	03.0	34	234.0	04.0	94	294.0	05.0
55	55.0	01.0	15	115.0	02.0	75	175.0	03.0	35	235.0	04.0	95	295.0	05.1
56	56.0	01.0	16	116.0	02.0	76	176.0	03.0	36	236.0	04.1	96	296.0	05.1
57	57.0	01.0	17	117.0	02.0	77	177.0	03.1	37	237.0	04.1	97	297.0	05.1
58	58.0	01.0	18	118.0	02.1	78	178.0	03.1	38	238.0	04.1	98	298.0	05.1
59	59.0	01.0	19	119.0	02.1	79	179.0	03.1	39	239.0	04.1	99	299.0	05.1
60	60.0	01.1	20	120.0	02.1	80	180.0	03.1	40	2.0.0	04.1	300	300.0	05.1
Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.

for 89 Degrees.

Difference of Latitude and Departure for 2 Degrees.

Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.
1	01.0	00.0	61	61.0	02.1	121	120.9	04.2	181	180.9	06.3	241	240.9	08.4
2	02.0	00.1	62	62.0	02.2	22	121.9	04.3	82	181.9	06.4	42	241.9	08.5
3	03.0	00.1	63	63.0	02.2	23	122.9	04.3	83	182.9	06.4	43	242.9	08.5
4	04.0	00.1	64	64.0	02.2	24	123.9	04.3	84	183.9	06.4	44	243.9	08.5
5	05.0	00.2	65	65.0	02.3	25	124.9	04.4	85	184.9	06.5	45	244.9	08.6
6	06.0	00.2	66	66.0	02.3	26	125.9	04.4	86	185.9	06.5	46	245.9	08.6
7	07.0	00.2	67	67.0	02.3	27	126.9	04.4	87	186.9	06.5	47	246.9	08.6
8	08.0	00.3	68	68.0	02.4	28	127.9	04.5	88	187.9	06.6	48	247.9	08.7
9	09.0	00.3	69	69.0	02.4	29	128.9	04.5	89	188.9	06.6	49	248.9	08.7
10	10.0	00.3	70	70.0	02.4	30	129.9	04.6	90	189.9	06.7	50	249.9	08.8
11	11.0	00.4	71	71.0	02.5	131	130.9	04.6	191	190.9	06.7	251	250.8	08.8
12	12.0	00.4	72	72.0	02.5	32	131.9	04.6	92	191.9	06.7	52	251.8	08.8
13	13.0	00.5	73	73.0	02.5	33	132.9	04.7	93	192.9	06.8	53	252.8	08.9
14	14.0	00.5	74	74.0	02.6	34	133.9	04.7	94	193.9	06.8	54	253.8	08.9
15	15.0	00.5	75	75.0	02.6	35	134.9	04.7	95	194.9	06.8	55	254.8	08.9
16	16.0	00.6	76	76.0	02.7	36	135.9	04.8	96	195.9	06.9	56	255.8	09.0
17	17.0	00.6	77	77.0	02.7	37	136.9	04.8	97	196.9	06.9	57	256.8	09.0
18	18.0	00.6	78	78.0	02.7	38	137.9	04.8	98	197.9	06.9	58	257.8	09.0
19	19.0	00.7	79	79.0	02.8	39	138.9	04.9	99	198.9	07.0	59	258.8	09.1
20	20.0	00.7	80	80.0	02.8	40	139.9	04.9	200	199.9	07.0	60	259.8	09.1
21	21.0	00.7	81	81.0	02.8	141	140.9	04.9	201	200.9	07.0	261	260.8	09.1
22	22.0	00.8	82	81.9	02.9	42	141.9	05.0	02	201.9	07.1	62	261.8	09.2
23	23.0	00.8	83	82.9	02.9	43	142.9	05.0	03	202.9	07.1	63	262.8	09.2
24	24.0	00.8	84	83.9	02.9	44	143.9	05.0	04	203.9	07.1	64	263.8	09.2
25	25.0	00.9	85	84.9	03.0	45	144.9	05.1	05	204.9	07.2	65	264.8	09.3
26	26.0	00.9	86	85.9	03.0	46	145.9	05.1	06	205.9	07.2	66	265.8	09.3
27	27.0	00.9	87	86.9	03.0	47	146.9	05.1	07	206.9	07.2	67	266.8	09.3
28	28.0	01.0	88	87.9	03.1	48	147.9	05.2	08	207.9	07.3	68	267.8	09.4
29	29.0	01.0	89	88.9	03.1	49	148.9	05.2	09	208.9	07.3	69	268.8	09.4
30	30.0	01.1	90	89.9	03.1	50	149.9	05.3	10	209.9	07.4	70	269.8	09.5
31	31.0	01.1	91	90.9	03.2	151	150.9	05.3	211	210.9	07.4	271	270.8	09.5
32	32.0	01.1	92	91.9	03.2	52	151.9	05.3	12	211.9	07.4	72	271.8	09.5
33	33.0	01.2	93	92.9	03.2	53	152.9	05.4	13	212.9	07.5	73	272.8	09.6
34	34.0	01.2	94	93.9	03.3	54	15309	05.4	14	213.9	07.5	74	273.8	09.6
35	35.0	01.2	95	94.9	03.3	55	154.9	05.4	15	214.9	07.5	75	274.8	09.6
36	36.0	01.3	96	95.9	03.4	56	155.9	05.5	16	215.9	07.6	76	275.8	09.7
37	37.0	01.3	97	96.9	03.4	57	156.9	05.5	17	216.9	07.6	77	276.8	09.7
38	38.0	01.3	98	97.9	03.4	58	157.9	05.5	18	217.9	07.6	78	277.8	09.7
39	39.0	01.4	99	98.9	03.5	59	158.9	05.6	19	218.9	07.7	79	278.8	09.8
40	40.0	01.4	100	99.9	03.5	60	159.9	05.6	20	219.9	07.7	80	279.8	09.8
41	41.0	01.4	101	100.9	03.5	161	160.9	05.6	221	220.9	07.7	281	280.8	09.8
42	42.0	01.5	02	101.9	03.6	62	161.9	05.7	22	221.9	07.8	82	281.8	09.9
43	43.0	01.5	03	102.9	03.6	63	162.9	05.7	23	222.9	07.8	83	282.8	09.9
44	44.0	01.5	04	103.9	03.6	64	163.9	05.7	24	223.9	07.8	84	283.8	09.9
45	45.0	01.6	05	104.9	03.7	65	164.9	05.8	25	224.9	07.9	85	284.8	10.0
46	46.0	01.6	06	105.9	03.7	66	165.9	05.8	26	225.9	07.9	86	285.8	10.0
47	47.0	01.6	07	106.9	03.7	67	166.9	05.8	27	226.9	07.9	87	286.8	10.0
48	48.0	01.7	08	107.9	03.8	68	167.9	05.9	28	227.9	08.0	88	287.8	10.1
49	49.0	01.7	09	108.9	03.8	69	168.9	05.9	29	228.9	08.0	89	288.8	10.1
50	50.0	01.7	10	109.9	03.8	70	169.9	06.0	30	229.9	08.1	90	289.8	10.2
51	51.0	01.8	111	110.9	03.9	171	170.9	06.0	231	230.9	08.1	291	290.8	10.2
52	52.0	01.8	12	111.9	03.9	72	171.9	06.0	32	231.9	08.1	92	291.8	10.2
53	53.0	01.8	13	112.9	04.0	73	172.9	06.1	33	232.9	08.2	93	292.8	10.3
54	54.0	01.9	14	113.9	04.0	74	173.9	06.1	34	233.9	08.2	94	293.8	10.3
55	55.0	01.9	15	114.9	04.0	75	174.9	06.1	35	234.9	08.2	95	294.8	10.3
56	56.0	02.0	16	115.9	04.1	76	175.9	06.2	36	235.9	08.3	96	295.8	10.4
57	57.0	02.0	17	116.9	04.1	77	176.9	06.2	37	236.9	08.3	97	296.8	10.4
58	58.0	02.0	18	117.9	04.1	78	177.9	06.2	38	237.9	08.3	98	297.8	10.4
59	59.0	02.1	19	118.9	04.2	79	178.9	06.3	39	238.9	08.4	99	298.8	10.5
60	60.0	02.1	20	119.9	04.2	80	179.9	06.3	40	239.9	08.4	300	299.8	10.5
Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep	Lat.

for 88 Degrees.

Difference of Latitude and Departure for 3 Degrees.

Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep	Dist	Lat.	Dep.	Dist	Lat	Dep.
1	01.0	00.1	61	60.9	03.2	121	120.8	06.3	181	180.7	09.5	241	240.7	12.6
2	02.0	00.1	62	61.9	03.2	22	121.8	06.4	82	181.7	09.5	42	241.7	12.7
3	03.0	00.2	63	62.9	03.3	23	122.8	06.4	83	182.7	09.6	43	242.7	12.7
4	04.0	00.2	64	63.9	03.3	24	123.8	06.5	84	183.7	09.6	44	243.7	12.8
5	05.0	00.3	65	64.9	03.4	25	124.8	06.5	85	184.7	09.7	45	244.7	12.8
6	06.0	00.3	66	65.9	03.5	26	125.8	06.6	86	185.7	09.7	46	245.7	12.9
7	07.0	00.4	67	66.9	03.5	27	126.8	06.6	87	186.7	09.8	47	246.7	12.9
8	08.0	00.4	68	67.9	03.6	28	127.8	06.7	88	187.7	09.8	48	247.7	13.0
9	09.0	00.5	69	68.9	03.6	29	128.8	06.8	89	188.7	09.9	49	248.7	13.0
10	10.0	00.5	70	69.9	03.7	30	129.8	06.8	90	189.7	09.9	50	249.7	13.1
11	11.0	00.6	71	70.9	03.7	131	130.8	06.9	191	190.7	10.0	251	250.6	13.1
12	12.0	00.6	72	71.9	03.8	32	131.8	06.9	92	191.7	10.0	52	251.6	13.2
13	13.0	00.7	73	72.9	03.8	33	132.8	07.0	93	192.7	10.1	53	252.6	13.2
14	14.0	00.7	74	73.9	03.9	34	133.8	07.0	94	193.7	10.1	54	253.6	13.3
15	15.0	00.8	75	74.9	03.9	35	134.8	07.1	95	194.7	10.2	55	254.6	13.3
16	16.0	00.8	76	75.9	04.0	36	135.8	07.1	96	195.7	10.3	56	255.6	13.4
17	17.0	00.9	77	76.9	04.0	37	136.8	07.2	97	196.7	10.3	57	256.6	13.4
18	18.0	00.9	78	77.9	04.1	38	137.8	07.2	98	197.7	10.4	58	257.6	13.5
19	19.0	01.0	79	78.9	04.1	39	138.8	07.3	99	198.7	10.4	59	258.6	13.6
20	20.0	01.0	80	79.9	04.2	40	139.8	07.3	200	199.7	10.5	60	259.6	13.6
21	21.0	01.1	81	80.9	04.2	141	140.8	07.4	201	200.7	10.5	261	260.6	13.7
22	22.0	01.1	82	81.9	04.3	42	141.8	07.4	02	201.7	10.6	62	261.6	13.7
23	23.0	01.2	83	82.9	04.3	43	142.8	07.5	03	202.7	10.6	63	262.6	13.8
24	24.0	01.3	84	83.9	04.4	44	143.8	07.5	04	203.7	10.7	64	263.6	13.8
25	25.0	01.3	85	84.9	04.4	45	144.8	07.6	05	204.7	10.7	65	264.6	13.9
26	26.0	01.4	86	85.9	04.5	46	145.8	07.6	06	205.7	10.8	66	265.6	13.9
27	27.0	01.4	87	86.9	04.6	47	146.8	07.7	07	206.7	10.8	67	266.6	14.0
28	28.0	01.5	88	87.9	04.6	48	147.8	07.7	08	207.7	10.9	68	267.6	14.0
29	29.0	01.5	89	88.9	04.7	49	148.8	07.8	09	208.7	10.9	69	268.6	14.1
30	30.0	01.6	90	89.9	04.7	50	149.8	07.9	10	209.7	11.0	70	269.6	14.1
31	31.0	01.6	91	90.9	04.8	151	150.8	07.9	211	210.7	11.0	271	270.6	14.2
32	32.0	01.7	92	91.9	04.8	52	151.8	08.0	12	211.7	11.1	72	271.6	14.2
33	33.0	01.7	93	92.9	04.9	53	152.8	08.0	13	212.7	11.1	73	272.6	14.3
34	34.0	01.8	94	93.9	04.9	54	153.8	08.1	14	213.7	11.2	74	273.6	14.3
35	35.0	01.8	95	94.9	05.0	55	154.8	08.1	15	214.7	11.2	75	274.6	14.4
36	35.9	01.9	96	95.9	05.0	56	155.8	08.2	16	215.7	11.3	76	275.6	14.4
37	36.9	01.9	97	96.9	05.1	57	156.8	08.2	17	216.7	11.4	77	276.6	14.5
38	37.9	02.0	98	97.9	05.1	58	157.8	08.3	18	217.7	11.4	78	277.6	14.5
39	38.9	02.0	99	98.9	05.2	59	158.8	08.3	19	218.7	11.5	79	278.6	14.6
40	39.9	02.1	100	99.9	05.2	60	159.8	08.4	20	219.7	11.5	80	279.6	14.7
41	40.9	02.1	101	100.9	05.3	161	160.8	08.4	221	220.7	11.6	281	280.6	14.7
42	41.9	02.2	02	101.9	05.3	62	161.8	08.5	22	221.7	11.6	82	281.6	14.8
43	42.9	02.2	03	102.9	05.4	63	162.8	08.5	23	222.7	11.7	83	282.6	14.8
44	43.9	02.3	04	103.9	05.4	64	163.8	08.6	24	223.7	11.7	84	283.6	14.9
45	44.9	02.4	05	104.9	05.5	65	164.8	08.6	25	224.7	11.8	85	284.6	14.9
46	45.9	02.4	06	105.9	05.5	66	165.8	08.7	26	225.7	11.8	86	285.6	15.0
47	46.9	02.5	07	106.9	05.6	67	166.8	08.7	27	226.7	11.9	87	286.6	15.0
48	47.9	02.5	08	107.8	05.7	68	167.8	08.8	28	227.7	11.9	88	287.6	15.1
49	48.9	02.6	09	108.8	05.7	69	168.8	08.8	29	228.7	12.0	89	288.6	15.1
50	49.9	02.6	10	109.8	05.8	70	169.8	08.9	30	229.7	12.0	90	289.6	15.2
51	50.9	02.7	111	110.8	05.8	171	170.8	09.0	231	230.7	12.1	291	290.6	15.2
52	51.9	02.7	12	111.8	05.9	72	171.8	09.0	32	231.7	12.1	92	291.6	15.3
53	52.9	02.8	13	112.8	05.9	73	172.8	09.1	33	232.7	12.2	93	292.6	15.3
54	53.9	02.8	14	113.8	06.0	74	173.8	09.1	34	233.7	12.2	94	293.6	15.4
55	54.9	02.9	15	114.8	06.0	75	174.8	09.2	35	234.7	12.3	95	294.6	15.4
56	55.9	02.9	16	115.8	06.1	76	175.8	09.2	36	235.7	12.3	96	295.6	15.5
57	56.9	03.0	17	116.8	06.1	77	176.8	09.3	37	236.7	12.4	97	296.6	15.5
58	57.9	03.0	18	117.8	06.2	78	177.8	09.3	38	237.7	12.5	98	297.6	15.6
59	58.9	03.1	19	118.8	06.2	79	178.8	09.4	39	238.7	12.5	99	298.6	15.6
60	59.9	03.1	20	119.8	06.3	80	179.8	09.4	40	239.7	12.6	300	299.6	15.7
Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.

for 87 Degrees.

Difference of Latitude and Departure for 4 Degrees.

Dist	Lat	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.
1	01.0	00.1	61	60.9	04.3	121	120.7	08.4	181	180.6	12.6	241	240.4	16.8
2	02.0	00.1	62	61.9	04.3	22	121.7	08.5	82	181.6	12.7	42	241.4	16.9
3	03.0	00.2	63	62.8	04.4	23	122.7	08.6	83	182.6	12.8	43	242.4	16.9
4	04.0	00.3	64	63.8	04.5	24	123.7	08.6	84	183.6	12.8	44	243.4	17.0
5	05.0	00.3	65	64.8	04.5	25	124.7	08.7	85	184.6	12.9	45	244.4	17.1
6	06.0	00.4	66	65.8	04.6	26	125.7	08.8	86	185.6	13.0	46	245.4	17.1
7	07.0	00.5	67	66.8	04.7	27	126.7	08.9	87	186.6	13.0	47	246.4	17.2
8	08.0	00.6	68	67.8	04.7	28	127.7	08.9	88	187.5	13.1	48	247.4	17.3
9	90.0	00.6	69	68.8	04.8	29	128.7	09.0	89	188.5	13.2	49	248.4	17.4
10	10.0	00.7	70	69.8	04.9	30	129.7	09.1	90	189.5	13.2	50	249.4	17.4
11	11.0	00.8	71	70.8	05.0	131	130.7	09.1	191	190.5	13.3	251	250.4	17.5
12	12.0	00.8	72	71.8	05.0	32	131.7	09.2	92	191.5	13.4	52	251.4	17.6
13	13.0	00.9	73	72.8	05.1	33	132.7	09.3	93	192.5	13.5	53	252.4	17.6
14	14.0	01.0	74	73.8	05.2	34	133.7	09.3	94	193.5	13.5	54	253.4	17.7
15	15.0	01.0	75	74.8	05.2	35	134.7	09.4	95	194.5	13.6	55	254.4	17.8
16	16.0	01.1	76	75.8	05.3	36	135.7	09.5	96	195.5	13.7	56	255.4	17.8
17	17.0	01.2	77	76.8	05.4	37	136.7	09.5	97	196.5	13.7	57	256.4	17.9
18	18.0	01.3	78	77.8	05.4	38	137.7	09.6	98	197.5	13.8	58	257.4	18.0
19	19.0	01.3	79	78.8	05.5	39	138.7	09.7	99	198.5	13.9	59	258.4	18.1
20	20.0	01.4	80	79.8	05.6	40	139.7	09.8	200	199.5	13.9	60	259.4	18.1
21	20.9	01.5	81	80.8	05.7	141	140.7	09.8	201	200.5	14.0	261	260.4	18.2
22	21.9	01.5	82	81.8	05.7	42	141.7	03.9	02	201.5	14.1	62	261.4	18.3
23	22.9	01.6	83	82.8	05.8	43	142.7	10.0	03	202.5	14.1	63	262.4	18.3
24	23.9	01.7	84	83.8	05.9	44	143.7	10.0	04	203.5	14.2	64	263.4	18.4
25	24.9	01.7	85	84.8	05.9	45	144.7	10.1	05	204.5	14.3	65	264.4	18.5
26	25.9	01.8	86	85.8	06.0	46	145.6	10.2	06	205.5	14.4	66	265.4	18.5
27	26.9	01.9	87	86.8	06.1	47	146.6	10.2	07	206.5	14.4	67	266.4	18.6
28	27.9	02.0	88	87.8	06.1	48	147.6	10.3	08	207.5	14.5	68	267.4	18.7
29	28.9	02.0	89	88.8	06.2	49	148.6	10.4	09	208.5	14.6	69	268.4	18.7
30	29.9	02.1	90	89.8	06.3	50	149.6	10.5	10	209.5	14.6	70	269.4	18.8
31	30.9	02.2	91	90.8	06.4	151	150.6	10.5	211	210.5	14.7	271	270.3	18.9
32	31.9	02.2	92	91.8	06.4	52	151.6	10.6	12	211.5	14.8	72	271.3	19.0
33	32.9	02.3	93	92.8	06.5	53	152.6	10.7	13	212.5	14.8	73	272.3	19.0
34	33.9	02.4	94	93.8	06.6	54	153.6	10.7	14	213.5	14.9	74	273.3	19.1
35	34.9	02.4	95	94.8	06.6	55	154.6	10.8	15	214.5	15.0	75	274.3	19.2
36	35.9	02.5	96	95.8	06.7	56	155.6	10.9	16	215.5	15.1	76	275.3	19.2
37	36.9	02.6	97	96.8	06.8	57	156.6	10.9	17	216.5	15.1	77	276.3	19.3
38	37.9	02.7	98	97.8	06.8	58	157.6	11.0	18	217.5	15.2	78	277.3	19.4
39	38.9	02.7	99	98.8	06.9	59	158.6	11.1	19	218.5	15.3	79	278.3	19.4
40	39.9	02.8	100	99.8	07.0	60	159.6	11.2	20	219.5	15.3	80	279.3	19.5
41	40.9	02.9	101	100.8	07.0	161	160.6	11.2	221	220.5	15.4	281	280.3	19.6
42	41.9	02.9	02	101.8	07.1	62	161.6	11.3	22	221.5	15.5	82	281.3	19.7
43	42.9	03.0	03	102.8	07.2	63	162.6	11.4	23	222.5	15.5	83	282.3	19.7
44	43.9	03.1	04	103.8	07.2	64	163.6	11.4	24	223.5	15.6	84	283.3	19.8
45	44.9	03.1	05	104.7	07.3	65	164.6	11.5	25	224.5	15.7	85	284.3	19.9
46	45.9	03.2	06	105.7	07.4	66	165.6	11.6	26	225.5	15.8	86	285.3	19.9
47	46.9	03.3	07	106.7	07.5	67	166.6	11.6	27	226.5	15.8	87	286.3	20.0
48	47.9	03.4	08	107.7	07.5	68	167.6	11.7	28	227.5	15.9	88	287.3	20.1
49	48.9	03.4	09	108.7	07.6	69	168.6	11.8	29	228.5	16.0	89	288.3	20.1
50	49.9	03.5	10	109.7	07.7	70	169.6	11.8	30	229.4	16.0	90	289.3	20.2
51	50.9	03.6	111	110.7	07.7	171	170.6	11.9	231	230.4	16.1	291	290.3	20.3
52	51.9	03.6	12	111.7	07.8	72	171.6	12.0	32	231.4	16.2	92	291.3	20.4
53	52.9	03.7	13	112.7	07.9	73	172.6	12.1	33	232.4	16.2	93	292.3	20.4
54	53.9	03.8	14	113.7	07.9	74	173.6	12.1	34	233.4	16.3	94	293.3	20.5
55	54.9	03.8	15	114.7	08.0	75	174.6	12.2	35	234.4	16.4	95	294.3	20.6
56	55.9	03.9	16	115.7	08.1	76	175.6	12.3	36	235.4	16.4	96	295.3	20.6
57	56.9	04.0	17	116.7	08.2	77	176.6	12.3	37	236.4	16.5	97	296.3	20.7
58	57.9	04.0	18	117.7	08.2	78	177.6	12.4	38	237.4	16.6	98	297.3	20.8
59	58.9	04.1	19	118.7	08.3	79	178.6	12.5	39	238.4	16.7	99	298.3	20.8
60	59.9	04.2	20	119.7	08.4	80	179.6	12.5	40	239.4	16.7	300	299.3	20.9
Dist	Dep.	Lat.	Dist	Dep	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.

for 86 Degrees.

Difference of Latitude and Departure for 5 Degrees.

Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.
1	01.0	00.1	61	60.8	05.3	121	120.5	10.5	181	180.3	15.7	241	240.1	21.0
2	02.0	00.2	62	61.8	05.4	22	121.5	10.6	82	181.3	15.8	42	241.1	21.1
3	03.0	00.3	63	62.8	05.5	23	122.5	10.7	83	182.3	15.9	43	242.1	21.1
4	04.0	00.3	64	63.8	05.6	24	123.5	10.8	84	183.3	16.0	44	243.1	21.2
5	05.0	00.4	65	64.8	05.7	25	124.5	10.9	85	184.3	16.1	45	244.1	21.3
6	06.0	00.5	66	65.7	05.8	26	125.5	11.0	86	185.3	16.2	46	245.1	21.4
7	07.0	00.6	67	66.7	05.8	27	126.5	11.1	87	186.3	16.3	47	246.1	21.5
8	08.0	00.7	68	67.7	05.9	28	127.5	11.2	88	187.3	16.4	48	247.1	21.6
9	09.0	00.8	69	68.7	06.0	29	128.5	11.3	89	188.3	16.4	49	248.1	21.7
10	10.0	00.9	70	69.7	06.1	30	129.5	11.4	90	189.3	16.5	50	249.1	21.8
11	11.0	01.0	71	70.7	06.2	131	130.5	11.4	191	190.3	16.6	251	250.0	21.8
12	12.0	01.0	72	71.7	06.3	32	131.5	11.5	92	191.3	16.7	52	251.0	21.9
13	12.9	01.1	73	72.7	06.4	33	132.5	11.6	93	192.3	16.8	53	252.0	22.0
14	13.9	01.2	74	73.7	06.5	34	133.5	11.7	94	193.3	16.9	54	253.0	22.1
15	14.9	01.3	75	74.7	06.5	35	134.5	11.7	95	194.3	17.0	55	254.0	22.2
16	15.9	01.4	76	75.7	06.6	36	135.5	11.8	96	195.3	17.2	56	255.0	22.3
17	16.9	01.5	77	76.7	06.7	37	136.5	11.9	97	196.3	17.1	57	256.0	22.4
18	17.9	01.6	78	77.7	06.8	38	137.5	12.0	98	197.2	17.2	58	257.0	22.4
19	18.9	01.7	79	78.7	06.9	39	138.5	12.1	99	198.2	17.3	59	258.0	22.5
20	19.9	01.7	80	79.7	07.0	40	139.5	12.2	200	199.2	17.4	60	259.0	22.6
21	20.9	01.8	81	80.7	07.1	141	140.5	12.3	201	200.2	17.5	261	260.0	22.7
22	21.9	01.9	82	81.7	07.2	42	141.5	12.4	02	201.2	17.6	62	261.0	22.8
23	22.9	02.0	83	82.7	07.2	43	142.5	12.4	03	202.2	17.7	63	262.0	22.9
24	23.9	02.1	84	83.7	07.3	44	143.5	12.5	04	203.2	17.7	64	263.0	23.0
25	24.9	02.2	85	84.7	07.4	45	144.4	12.6	05	204.2	17.8	65	264.0	23.1
26	25.9	02.3	86	85.7	07.5	46	145.4	12.7	06	205.2	17.9	66	265.0	23.1
27	26.9	02.4	87	86.7	07.6	47	146.4	12.8	07	206.2	18.0	67	266.0	23.2
28	27.9	02.4	88	87.7	07.7	48	147.4	12.9	08	207.2	18.1	68	267.0	23.3
29	28.9	02.5	89	88.7	07.8	49	148.4	13.0	09	208.2	18.2	69	268.0	23.4
30	29.9	02.6	90	89.7	07.8	50	149.4	13.1	10	209.2	18.3	70	269.0	23.5
31	30.9	02.7	91	90.7	07.9	151	150.4	13.1	211	210.2	18.4	271	270.0	23.6
32	31.9	02.8	92	91.6	08.0	52	151.4	13.2	12	211.2	18.4	72	271.0	23.7
33	32.9	02.9	93	92.6	08.1	53	152.4	13.3	13	212.2	18.5	73	272.0	23.8
34	33.9	03.0	94	93.6	08.2	54	153.4	13.4	14	213.2	18.6	74	273.0	23.8
35	34.9	03.1	95	94.6	08.3	55	154.4	13.5	15	214.2	18.7	75	274.0	23.9
36	35.9	03.1	96	95.6	08.4	56	155.4	13.6	16	215.2	18.8	76	275.0	24.0
37	36.9	03.2	97	96.6	08.5	57	156.4	13.7	17	216.2	18.9	77	275.9	24.1
38	37.9	03.3	98	97.6	08.5	58	157.4	13.7	18	217.2	19.0	78	276.9	24.2
39	38.9	03.4	99	98.6	08.6	59	158.4	13.8	19	218.2	19.1	79	277.9	24.3
40	39.8	03.5	100	99.6	08.7	60	159.4	13.9	20	219.2	19.1	80	278.9	24.4
41	40.8	03.6	101	100.6	08.8	161	160.4	14.0	221	220.2	19.2	281	279.9	24.4
42	41.8	03.7	02	101.6	08.9	62	161.4	14.1	22	221.2	19.3	82	280.9	24.5
43	42.8	03.8	03	102.6	09.0	63	162.4	14.2	23	222.2	19.4	83	281.9	24.6
44	43.8	03.8	04	103.6	09.0	64	163.4	14.3	24	223.1	19.5	84	282.9	24.7
45	44.8	03.9	05	104.6	09.1	65	164.4	14.4	25	224.1	19.6	85	283.9	24.8
46	45.8	04.0	06	105.6	09.2	66	165.4	14.4	26	225.1	19.7	86	284.9	24.9
47	46.8	04.1	07	106.6	09.3	67	166.4	14.5	27	226.1	19.7	87	285.9	25.0
48	47.8	04.2	08	107.6	09.4	68	167.4	14.6	28	227.1	19.8	88	286.9	25.1
49	48.8	04.3	09	108.6	09.5	69	168.4	14.7	29	228.1	19.9	89	287.9	25.1
50	49.8	04.4	10	109.6	09.6	70	169.4	14.8	30	229.1	20.0	90	288.9	25.2
51	50.8	04.4	111	110.6	09.7	171	170.4	14.9	231	230.1	20.1	291	289.9	25.3
52	51.8	04.5	12	111.6	09.7	72	171.3	15.0	32	231.1	20.2	92	290.9	25.4
53	52.8	04.6	13	112.6	09.8	73	172.3	15.1	33	232.1	20.3	93	291.9	25.5
54	53.8	04.7	14	113.6	09.9	74	173.3	15.1	34	233.1	20.4	94	292.9	25.6
55	54.8	04.8	15	114.6	10.0	75	174.3	15.2	35	234.1	20.4	95	293.9	25.7
56	55.8	04.9	16	115.6	10.1	76	175.3	15.3	36	235.1	20.5	96	294.9	25.8
57	56.8	05.0	17	116.6	10.2	77	176.3	15.4	37	236.1	20.6	97	295.9	25.8
58	57.8	05.1	18	117.6	10.3	78	177.3	15.5	38	237.1	20.7	98	296.9	25.9
59	58.8	05.1	19	118.5	10.4	79	178.3	15.6	39	238.1	20.8	99	297.9	26.0
60	59.8	05.2	20	119.5	10.4	80	179.3	15.7	40	239.1	20.9	300	298.9	26.1
Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.

for 85 Degrees.

Difference of Latitude and Departure for 6 Degrees.

Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat	Dep.	Diſt	Lat.	Dep.
1	01.0	00.1	61	60.7	06.4	121	120.3	12.6	181	180.0	18.9	241	239.7	25.2
2	02.0	00.2	62	61.7	06.5	22	121.3	12.7	82	181.0	19.0	42	240.7	25.3
3	03.0	00.3	63	62.7	06.6	23	122.3	12.9	83	182.0	19.1	43	241.7	25.4
4	04.0	00.4	64	63.6	06.7	24	123.3	13.0	84	183.0	19.2	44	242.7	25.5
5	05.0	00.5	65	64.6	06.8	25	124.3	13.1	85	184.0	19.3	45	243.7	25.6
6	06.0	00.6	66	65.6	06.9	26	125.3	13.2	86	185.0	19.4	46	244.6	25.7
7	07.0	00.7	67	66.6	07.0	27	126.3	13.3	87	186.0	19.5	47	245.6	25.8
8	08.0	00.8	68	67.6	07.1	28	127.3	13.4	88	187.0	19.6	48	246.6	25.9
9	08.9	00.9	69	68.6	07.2	29	128.3	13.5	89	188.0	19.8	49	247.6	26.0
10	09.9	01.0	70	69.6	07.3	30	129.3	13.6	90	189.0	19.9	50	248.6	26.1
11	10.9	01.1	71	70.6	07.4	131	130.3	13.7	191	189.9	20.0	251	249.6	26.2
12	11.9	01.3	72	71.6	07.5	32	131.3	13.8	92	190.9	20.1	52	250.6	26.3
13	12.9	01.4	73	72.6	07.6	33	132.3	13.9	93	191.9	20.2	53	251.6	26.4
14	13.9	01.5	74	73.6	07.7	34	133.3	14.0	94	192.9	20.3	54	252.6	26.5
15	14.9	01.6	75	74.6	07.8	35	134.3	14.1	95	193.9	20.4	55	253.6	26.6
16	15.9	01.7	76	75.6	07.9	36	135.3	14.2	96	194.9	20.5	56	254.6	26.8
17	16.9	01.8	77	76.6	08.0	37	136.2	14.3	97	195.9	20.6	57	255.6	26.9
18	17.9	01.9	78	77.6	08.1	38	137.2	14.4	98	196.9	20.7	58	256.6	27.0
19	18.9	02.0	79	78.6	08.3	39	138.2	14.5	99	197.9	20.8	59	257.6	27.1
20	19.9	02.1	80	79.6	08.4	40	139.2	14.6	200	198.9	20.9	60	258.6	27.2
21	20.9	02.2	81	80.6	08.5	141	140.2	14.7	201	199.9	21.0	261	259.6	27.3
22	21.9	02.3	82	81.5	08.6	42	141.2	14.8	02	200.9	21.1	62	260.6	27.4
23	22.9	02.4	83	82.5	08.7	43	142.2	14.9	03	201.9	21.2	63	261.6	27.5
24	23.9	02.5	84	83.5	08.8	44	143.2	15.0	04	202.9	21.3	64	262.5	27.6
25	24.9	02.6	85	84.5	08.9	45	144.2	15.2	05	203.9	21.4	65	263.5	27.7
26	25.9	02.7	86	85.5	09.0	46	145.2	15.3	06	204.9	21.5	66	264.5	27.8
27	26.9	02.8	87	86.5	09.1	47	146.2	15.4	07	205.9	21.6	67	265.5	27.9
28	27.8	02.9	88	87.5	09.2	48	147.2	15.5	08	206.9	21.7	68	266.5	28.0
29	28.8	03.0	89	88.5	09.3	49	148.2	15.6	09	207.9	21.8	69	267.5	28.1
30	20.8	03.1	90	89.5	09.4	50	149.2	15.7	10	208.8	21.9	70	268.5	28.2
31	30.8	03.2	91	90.5	09.5	151	150.2	15.8	211	209.8	22.0	271	269.5	28.3
32	31.8	03.3	92	91.5	09.6	52	151.2	15.9	12	210.8	22.2	72	270.5	28.4
33	32.8	03.4	93	92.5	09.7	53	152.2	16.0	13	211.8	22.3	73	271.5	28.5
34	33.8	03.6	94	93.5	09.8	54	153.2	16.1	14	212.8	22.4	74	272.5	28.6
35	34.8	03.7	95	94.5	09.9	55	154.1	16.2	15	213.8	22.5	75	273.5	28.7
36	35.8	03.8	96	95.5	10.0	56	155.1	16.3	16	214.8	22.6	76	274.5	28.8
37	36.8	03.9	97	96.5	10.1	57	156.1	16.4	17	215.8	22.7	77	275.5	28.9
38	37.8	04.0	98	97.5	10.2	58	157.1	16.5	18	216.8	22.8	78	276.5	29.1
39	38.8	04.1	99	98.5	10.3	59	158.1	16.6	19	217.8	22.9	79	277.5	29.2
40	39.8	04.2	100	99.5	10.5	60	159.1	16.7	20	218.8	23.0	80	278.5	29.3
41	40.8	04.3	101	100.4	10.6	161	160.1	16.8	221	219.8	23.1	281	279.5	29.4
42	41.8	04.4	02	101.4	10.7	62	161.1	16.9	22	220.8	23.2	82	280.4	29.5
43	42.8	04.5	03	102.4	10.8	63	162.1	17.0	23	221.8	23.3	83	281.4	29.6
44	43.8	04.6	04	103.4	10.9	64	163.1	17.1	24	222.8	23.4	84	282.4	29.7
45	44.8	04.7	05	104.4	11.0	65	164.1	17.2	25	223.8	23.5	85	283.4	29.8
46	45.7	04.8	06	105.4	11.1	66	165.1	17.3	26	224.8	23.6	86	284.4	29.9
47	46.7	04.9	07	106.4	11.2	67	166.1	17.5	27	225.8	23.7	87	285.4	30.0
48	47.7	05.0	08	107.4	11.3	68	167.1	17.6	28	226.7	23.8	88	286.4	30.1
49	48.7	05.1	09	108.4	11.4	69	168.1	17.7	29	227.7	23.9	89	287.4	30.2
50	40.7	05.2	10	109.4	11.5	70	169.1	17.8	30	228.7	24.0	90	288.4	30.3
51	50.7	05.3	111	110.4	11.6	171	170.1	17.9	231	229.7	24.1	291	289.4	30.4
52	51.7	05.4	12	111.4	11.7	72	171.1	18.0	32	230.7	24.2	92	290.4	30.5
53	52.7	05.5	13	112.4	11.8	73	172.0	18.1	33	231.7	24.3	93	291.4	30.6
54	53.7	05.6	14	113.4	11.9	74	173.0	18.2	34	232.7	24.5	94	292.4	30.7
55	54.7	05.7	15	114.4	12.0	75	174.0	18.3	35	233.7	24.6	95	293.4	30.8
56	55.7	05.9	16	115.4	12.1	76	175.0	18.4	36	234.7	24.7	96	294.4	30.9
57	56.7	06.0	17	116.4	12.2	77	176.0	18.5	37	235.7	24.8	97	295.4	31.0
58	57.7	06.1	18	117.4	12.3	78	177.0	18.6	38	236.7	24.9	98	296.4	31.1
59	58.7	06.2	19	118.3	12.4	79	178.0	18.7	39	237.7	25.0	99	297.4	31.2
60	59.7	06.3	20	119.3	12.5	80	179.0	18.8	40	238.7	25.1	300	298.4	31.4
Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.

for 84 Degrees.

Difference of Latitude and Departure for 7 Degrees.

Dist	Lat	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep
1	01.0	00.1	61	60.5	07.4	121	120.1	14.7	181	179.6	22.0	241	239.2	29.3
2	02.0	00.2	62	61.5	07.5	22	121.1	14.9	82	180.6	22.2	42	240.2	29.5
3	03.0	00.4	63	62.5	07.7	23	122.1	15.0	83	181.6	22.3	43	241.2	29.6
4	04.0	00.5	64	63.5	07.8	24	123.1	15.1	84	182.6	22.4	44	242.2	29.7
5	05.0	00.6	65	64.5	07.9	25	124.1	15.2	85	183.6	22.5	45	243.2	29.8
6	06.0	00.7	66	65.5	08.0	26	125.1	15.3	86	184.6	22.7	46	244.1	29.9
7	06.9	00.9	67	66.5	08.2	27	126.0	15.5	87	185.6	22.8	47	245.1	30.1
8	07.9	01.0	68	67.5	08.3	28	127.0	15.6	88	186.6	22.9	48	246.1	30.2
9	08.9	01.1	69	68.5	08.4	29	128.0	15.7	89	187.6	23.0	49	247.1	30.3
10	09.9	01.2	70	69.5	08.5	30	129.0	15.8	90	188.6	23.1	50	248.1	30.4
11	10.9	01.3	71	70.5	08.6	131	130.0	16.0	191	189.6	23.3	251	249.1	30.6
12	11.9	01.5	72	71.5	08.8	32	131.0	16.1	92	190.6	23.4	52	250.1	30.7
13	12.9	01.6	73	72.5	08.9	33	132.0	16.2	93	191.6	23.5	53	251.1	30.8
14	13.9	01.7	74	73.4	09.0	34	133.0	16.3	94	192.5	23.6	54	252.1	30.9
15	14.9	01.8	75	74.4	09.1	35	134.0	16.4	95	193.5	23.7	55	253.1	31.0
16	15.9	01.9	76	75.4	09.3	36	135.0	16.6	96	194.5	23.9	56	254.1	31.2
17	16.9	02.1	77	76.4	09.4	37	136.0	16.7	97	195.5	24.0	57	255.1	31.3
18	17.9	02.2	78	77.4	09.5	38	137.0	16.8	98	196.5	24.1	58	256.1	31.4
19	18.9	02.3	79	78.4	09.6	39	138.0	16.9	99	197.5	24.2	59	257.1	31.5
20	19.9	02.4	80	79.4	09.7	40	139.0	17.1	200	198.5	24.4	60	258.1	31.7
21	20.8	02.6	81	80.4	09.9	141	139.9	17.2	201	199.5	24.5	261	259.0	31.8
22	21.8	02.7	82	81.4	10.0	42	140.9	17.3	02	200.5	24.6	62	260.0	31.9
23	22.8	02.8	83	82.4	10.1	43	141.9	17.4	03	201.5	24.7	63	261.0	32.0
24	23.8	02.9	84	83.4	10.2	44	142.9	17.5	04	202.5	24.8	64	262.0	32.1
25	24.8	03.0	85	84.4	10.4	45	143.9	17.7	05	203.5	25.0	65	263.0	32.3
26	25.8	03.2	86	85.4	10.5	46	144.9	17.8	06	204.5	25.1	66	264.0	32.4
27	26.8	03.3	87	86.3	10.6	47	145.9	17.9	07	205.4	25.2	67	265.0	32.5
28	27.8	03.4	88	87.3	10.7	48	146.9	18.0	08	206.4	25.3	68	266.0	32.6
29	28.8	03.5	89	88.3	10.8	49	147.9	18.1	09	207.4	25.4	69	267.0	32.8
30	29.8	03.7	90	89.3	11.0	50	148.9	18.3	10	208.4	25.6	70	268.0	32.9
31	30.8	03.8	91	90.3	11.1	151	149.9	18.4	211	209.4	25.7	271	269.0	33.0
32	31.8	03.9	92	91.3	11.2	52	150.9	18.5	12	210.4	25.8	72	270.0	33.1
33	32.8	04.0	93	92.3	11.3	53	151.9	18.6	13	211.4	25.9	73	271.0	33.2
34	33.7	04.1	94	93.3	11.5	54	152.8	18.7	14	212.4	26.1	74	271.9	33.4
35	34.7	04.3	95	94.3	11.6	55	153.8	18.9	15	213.4	26.2	75	272.9	33.5
36	35.7	04.4	96	95.3	11.7	56	154.8	19.0	16	214.4	26.3	76	273.9	33.6
37	36.7	04.5	97	96.3	11.8	57	155.8	19.1	17	215.4	26.4	77	274.9	33.7
38	37.7	04.6	98	97.3	11.9	58	156.8	19.2	18	216.4	26.5	78	275.9	33.9
39	38.7	04.8	99	98.3	12.1	59	157.8	19.4	19	217.4	26.7	79	276.9	34.0
40	39.7	04.9	100	99.3	12.2	60	158.8	19.5	20	218.4	26.8	80	277.9	34.1
41	40.7	05.0	101	100.2	12.3	161	159.8	19.6	221	219.3	26.9	281	278.9	34.2
42	41.7	05.1	02	101.2	12.4	62	160.8	19.7	22	220.3	27.0	82	279.9	34.3
43	42.7	05.2	03	102.2	12.5	63	161.8	19.8	23	221.3	27.2	83	280.9	34.5
44	43.7	05.4	04	103.2	12.7	64	162.8	20.0	24	222.3	27.3	84	281.9	34.6
45	44.7	05.5	05	104.2	12.8	65	163.8	20.1	25	223.3	27.4	85	282.9	34.7
46	45.7	05.6	06	105.2	12.9	66	164.8	20.2	26	224.3	27.5	86	283.9	34.8
47	46.6	05.7	07	106.2	13.0	67	165.7	20.3	27	225.3	27.6	87	284.8	34.9
48	47.6	05.8	08	107.2	13.1	68	166.7	20.5	28	226.3	27.8	88	285.8	35.1
49	48.6	06.0	09	108.2	13.3	69	167.7	20.6	29	227.3	27.9	89	286.8	35.2
50	49.6	06.1	10	109.2	13.4	70	168.7	20.7	30	228.3	28.0	90	287.8	35.3
51	50.6	06.2	111	110.2	13.5	171	169.7	20.8	231	229.3	28.1	291	288.8	35.4
52	51.6	06.3	12	111.2	13.6	72	170.7	20.9	32	230.3	28.3	92	289.8	35.5
53	52.6	06.5	13	112.2	13.8	73	171.7	21.1	33	231.3	28.4	93	290.8	35.7
54	53.6	06.6	14	113.1	13.9	74	172.7	21.2	34	232.2	28.5	94	291.8	35.8
55	54.6	06.7	15	114.1	14.0	75	173.7	21.3	35	233.2	28.6	95	292.8	35.9
56	55.6	06.8	16	115.1	14.1	76	174.7	21.4	36	234.2	28.7	96	293.8	36.0
57	56.6	06.9	17	116.1	14.2	77	175.7	21.6	37	235.2	28.9	97	294.8	36.2
58	57.6	07.1	18	117.1	14.4	78	176.7	21.7	38	236.2	29.0	98	295.8	36.3
59	58.6	07.2	19	118.1	14.5	79	177.7	21.8	39	237.2	29.1	99	296.8	36.4
60	59.6	07.3	20	119.1	14.6	80	178.7	21.9	40	238.2	29.2	300	297.8	36.6
Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.

for 83 Degrees.

Difference of Latitude and Departure for 8 Degrees.

Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.
1	01.0	00.1	61	60.4	08.5	121	119.8	16.8	181	179.2	25.2	241	238.7	33.5
2	02.0	00.3	62	61.4	08.6	22	120.8	17.0	82	180.2	25.3	42	239.7	33.7
3	03.0	00.4	63	62.4	08.8	23	121.8	17.1	83	181.2	25.5	43	240.6	33.8
4	04.0	00.6	64	63.4	08.9	24	122.8	17.3	84	182.2	25.6	44	241.6	34.0
5	05.0	00.7	65	64.4	09.0	25	123.8	17.4	85	183.2	25.8	45	242.6	34.1
6	05.9	00.8	66	65.4	09.2	26	124.8	17.5	86	184.2	25.9	46	243.6	34.2
7	06.9	01.0	67	66.4	09.3	27	125.8	17.7	87	185.2	26.0	47	244.6	34.4
8	07.9	01.1	68	67.3	09.5	28	126.8	17.8	88	186.2	26.2	48	245.6	34.5
9	08.9	01.3	69	68.3	09.6	29	127.7	18.0	89	187.2	26.3	49	246.6	34.7
10	09.9	01.4	70	69.3	09.7	30	128.7	18.1	90	188.2	26.4	50	247.6	34.8
11	10.9	01.5	71	70.3	09.9	131	129.7	18.2	191	189.1	26.6	251	248.6	34.9
12	11.9	01.7	72	71.3	10.0	32	130.7	18.4	92	190.1	26.7	52	249.6	35.1
13	12.9	01.8	73	72.3	10.2	33	131.7	18.5	93	191.1	26.9	53	250.5	35.2
14	13.9	01.9	74	73.3	10.3	34	132.7	18.7	94	192.1	27.0	54	251.5	35.4
15	14.9	02.1	75	74.3	10.4	35	133.7	18.8	95	193.1	27.1	55	252.5	35.5
16	15.8	02.2	76	75.3	10.6	36	134.7	18.9	96	194.1	27.3	56	253.5	35.6
17	16.8	02.4	77	76.3	10.7	37	135.7	19.1	97	195.1	27.4	57	254.5	35.8
18	17.8	02.5	78	77.2	10.9	38	136.7	19.2	98	196.1	27.6	58	255.5	35.9
19	18.8	02.6	79	78.2	11.0	39	137.7	19.3	99	197.1	27.7	59	256.5	36.1
20	19.8	02.8	80	79.2	11.1	40	138.6	19.5	200	198.1	27.8	60	257.5	36.2
21	20.8	02.9	81	80.2	11.3	141	139.6	19.6	201	199.0	28.0	261	258.5	36.3
22	21.8	03.1	82	81.2	11.4	42	140.6	19.8	02	200.0	28.1	62	259.5	36.5
23	22.8	03.2	83	82.2	11.6	43	141.6	19.9	03	201.0	28.3	63	260.4	36.6
24	23.8	03.3	84	83.2	11.7	44	142.6	20.0	04	202.0	28.4	64	261.4	36.7
25	24.8	03.5	85	84.2	11.8	45	143.6	20.2	05	203.0	28.5	65	262.4	36.9
26	25.7	03.6	86	85.2	12.0	46	144.6	20.3	06	204.0	28.7	66	263.4	37.0
27	26.7	03.8	87	86.2	12.1	47	145.6	20.5	07	205.0	28.8	67	264.4	37.2
28	27.7	03.9	88	87.1	12.2	48	146.6	20.6	08	206.0	29.0	68	265.4	37.3
29	28.7	04.0	89	88.1	12.4	49	147.6	20.7	09	207.0	29.1	69	266.4	37.4
30	29.7	04.2	90	89.1	12.5	50	148.5	20.9	10	208.0	29.2	70	267.4	37.6
31	30.7	04.3	91	90.1	12.7	151	149.5	21.0	211	209.0	29.4	271	268.4	37.7
32	31.7	04.5	92	91.1	12.8	52	150.5	21.2	12	209.9	29.5	72	269.4	37.9
33	32.7	04.6	93	92.1	12.9	53	151.5	21.3	13	210.9	29.6	73	270.4	38.0
34	33.7	04.7	94	93.1	13.1	54	152.5	21.4	14	211.9	29.8	74	271.3	38.1
35	34.7	04.9	95	94.1	13.2	55	153.5	21.6	15	212.9	29.9	75	272.3	38.3
36	35.7	05.0	96	95.1	13.4	56	154.5	21.7	16	213.9	30.1	76	273.3	38.4
37	36.6	05.2	97	96.1	13.5	57	155.5	21.9	17	214.9	30.2	77	274.3	38.6
38	37.6	05.4	98	97.0	13.6	58	156.5	22.0	18	215.9	30.3	78	275.3	38.7
39	38.6	05.5	99	98.0	13.8	59	157.5	22.1	19	216.9	30.5	79	276.3	38.8
40	39.6	05.6	100	99.0	13.9	60	158.4	22.3	20	217.9	30.6	80	277.3	39.0
41	40.6	05.7	101	100.0	14.1	161	159.4	22.4	221	218.9	30.8	281	278.3	39.1
42	41.6	05.8	02	101.0	14.2	62	160.4	22.6	22	219.8	30.9	82	279.3	39.3
43	42.6	06.0	03	102.0	14.3	63	161.4	22.7	23	220.8	31.0	83	280.3	39.4
44	43.6	06.1	04	103.0	14.5	64	162.4	22.8	24	221.8	31.2	84	281.2	39.5
45	44.6	06.3	05	104.0	14.6	65	163.4	23.0	25	222.8	31.3	85	282.2	39.7
46	45.6	06.4	06	105.0	14.8	66	164.4	23.1	26	223.8	31.5	86	283.2	39.8
47	46.5	06.5	07	106.0	14.9	67	165.4	23.2	27	224.8	31.6	87	284.2	40.0
48	47.5	06.7	08	107.0	15.0	68	166.4	23.4	28	225.8	31.7	88	285.2	40.1
49	48.5	06.8	09	107.9	15.2	69	167.4	23.5	29	226.8	31.9	89	286.2	40.2
50	49.5	07.0	10	108.9	15.3	70	168.4	23.7	30	227.8	32.0	90	187.2	40.4
51	50.5	07.1	111	109.9	15.5	171	169.3	23.8	231	228.8	32.2	291	288.2	40.5
52	51.5	07.2	12	110.9	15.6	72	170.3	23.9	32	229.7	32.3	92	289.2	40.6
53	52.5	07.4	13	111.9	15.7	73	171.3	24.1	33	230.7	32.4	93	290.2	40.8
54	53.5	07.5	14	112.9	15.9	74	172.3	24.2	34	231.7	32.6	94	291.1	40.9
55	54.5	07.7	15	113.9	16.0	75	173.3	24.4	35	232.7	32.7	95	292.1	41.1
56	55.5	07.8	16	114.9	16.1	76	174.3	24.5	36	233.7	32.9	96	293.1	41.2
57	56.4	07.9	17	115.9	16.3	77	175.3	24.6	37	234.7	33.0	97	294.1	41.3
58	57.4	08.1	18	116.9	16.4	78	176.3	24.7	38	235.7	33.1	98	295.1	41.5
59	58.4	08.2	19	117.8	16.6	79	177.3	24.9	39	236.7	33.3	99	296.1	41.6
60	59.4	08.4	20	118.8	16.7	80	178.3	25.1	40	237.7	33.4	300	297.1	41.8
Dist	Dep.	Lat	Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.

for 82 Degrees.

Difference of Latitude and Departure for 9 Degrees.

Diſt	Lat	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep
1	01.0	00.2	61	60.2	09.5	121	119.5	18.9	181	178.8	28.3	241	238.0	37.7
2	02.0	00.3	62	61.2	09.7	22	120.5	19.1	82	179.8	28.5	42	239.0	37.8
3	03.0	00.5	63	62.2	09.9	23	121.5	19.2	83	180.7	28.6	43	240.0	38.0
4	04.0	00.6	64	63.2	10.0	24	122.5	19.4	84	181.7	28.8	44	241.0	38.2
5	04.9	00.8	65	64.2	10.2	25	123.5	19.6	85	182.7	28.9	45	242.0	38.3
6	05.9	00.9	66	65.2	10.3	26	124.5	19.7	86	183.7	29.1	46	243.0	38.5
7	06.9	01.1	67	66.2	10.5	27	125.4	19.9	87	184.7	29.2	47	244.0	38.6
8	07.9	01.3	68	67.2	10.6	28	126.4	20.0	88	185.7	29.4	48	244.9	38.8
9	08.9	01.4	69	68.2	10.8	29	127.4	20.2	89	186.7	29.6	49	245.9	38.9
10	09.9	01.6	70	69.1	10.9	30	128.4	20.3	90	187.7	29.7	50	246.9	39.1
11	10.9	01.7	71	70.1	11.1	131	129.4	20.5	191	188.7	29.9	251	247.9	39.3
12	11.9	01.9	72	71.1	11.3	32	130.4	20.6	92	189.6	30.0	52	248.9	39.4
13	12.9	02.0	73	72.1	11.4	33	131.4	20.8	93	190.6	30.2	53	249.9	39.6
14	13.8	02.2	74	73.1	11.6	34	132.4	21.0	94	191.6	30.3	54	250.9	39.7
15	14.8	02.3	75	74.1	11.7	35	133.3	21.1	95	192.6	30.5	55	251.9	39.9
16	15.8	02.5	76	75.1	11.9	36	134.3	21.3	96	193.6	30.7	56	252.9	40.0
17	16.8	02.7	77	76.1	12.0	37	135.3	21.4	97	194.6	30.8	57	253.8	40.2
18	17.8	02.8	78	77.0	12.2	38	136.3	21.6	98	195.6	31.0	58	254.8	40.4
19	18.8	03.0	79	78.0	12.4	39	137.3	21.7	99	196.6	31.1	59	255.8	40.5
20	19.8	03.1	80	79.0	12.5	40	138.3	21.9	200	197.5	31.3	60	256.8	40.7
21	20.7	03.3	81	80.0	12.7	141	139.3	22.1	201	198.5	31.4	261	257.8	40.8
22	21.7	03.4	82	81.0	12.8	42	140.3	22.2	02	199.5	31.6	62	258.8	41.0
23	22.7	03.6	83	82.0	13.0	43	141.2	22.4	03	200.5	31.7	63	259.8	41.1
24	23.7	03.8	84	83.0	13.1	44	142.2	22.5	04	201.5	31.9	64	260.8	41.3
25	24.7	03.9	85	84.0	13.3	45	143.2	22.7	05	202.5	32.1	65	261.7	41.4
26	25.7	04.1	86	84.9	13.5	46	144.2	22.8	06	203.5	32.2	66	262.7	41.6
27	26.7	04.2	87	85.9	13.6	47	145.2	23.0	07	204.5	32.4	67	263.7	41.8
28	27.7	04.4	88	86.9	13.8	48	146.2	23.1	08	205.4	32.5	68	264.7	41.9
29	28.6	04.5	89	87.9	13.9	49	147.2	23.3	09	206.4	32.7	69	265.7	42.1
30	29.6	04.7	90	88.9	14.1	50	148.2	23.5	10	207.4	32.8	70	266.7	42.2
31	30.6	04.8	91	89.9	14.2	151	149.1	23.6	211	208.4	33.0	271	267.7	42.4
32	31.6	05.0	92	90.9	14.4	52	150.1	23.8	12	209.4	33.2	72	268.6	42.5
33	32.6	05.2	93	91.9	14.5	53	151.1	23.9	13	210.4	33.3	73	269.6	42.7
34	33.6	05.3	94	92.8	14.7	54	152.1	24.1	14	211.4	33.5	74	270.6	42.9
35	34.6	05.5	95	93.8	14.9	55	153.1	24.2	15	212.4	33.6	75	271.6	43.0
36	35.6	05.6	96	94.8	15.0	56	154.1	24.4	16	213.3	33.8	76	272.6	43.2
37	36.5	05.8	97	95.8	15.2	57	155.1	24.6	17	214.3	33.9	77	273.6	43.3
38	37.5	05.9	98	96.8	15.3	58	156.1	24.7	18	215.3	34.1	78	274.6	43.5
39	38.5	06.1	99	97.8	15.5	59	157.0	24.9	19	216.3	34.3	79	275.6	43.6
40	39.5	06.3	100	98.8	15.6	60	158.0	25.0	20	217.3	34.4	80	276.6	43.8
41	40.5	06.4	101	99.8	15.8	161	159.0	25.2	221	218.3	34.6	281	277.5	43.9
42	41.5	06.6	02	100.7	16.0	62	160.0	25.3	22	219.3	34.7	82	278.5	44.1
43	42.5	06.7	03	101.7	16.1	63	161.0	25.5	23	220.3	34.9	83	279.5	44.3
44	43.5	06.9	04	102.7	16.3	64	162.0	25.6	24	221.2	35.0	84	280.5	44.4
45	44.4	07.0	05	103.7	16.4	65	163.0	25.8	25	222.2	35.2	85	281.5	44.6
46	45.4	07.2	06	104.7	16.6	66	164.0	26.0	26	223.2	35.3	86	282.5	44.7
47	46.4	07.4	07	105.7	16.7	67	164.9	26.1	27	224.2	35.5	87	283.5	44.9
48	47.4	07.5	08	106.7	16.9	68	165.9	26.3	28	225.2	35.7	88	284.5	45.0
49	48.4	07.7	09	107.7	17.0	69	166.9	26.4	29	226.2	35.8	89	285.4	45.2
50	49.4	07.8	10	108.6	17.2	70	167.9	26.6	30	227.2	36.0	90	286.4	45.4
51	50.4	08.0	111	109.6	17.4	171	168.9	26.7	231	228.2	36.1	291	287.4	45.5
52	51.4	08.1	12	110.6	17.5	72	169.9	26.9	32	229.1	36.3	92	288.4	45.7
53	52.3	08.3	13	111.6	17.7	73	170.9	27.1	33	230.1	36.4	93	289.4	45.8
54	53.3	08.4	14	112.6	17.8	74	171.9	27.2	34	231.1	36.6	94	290.4	46.0
55	54.3	08.6	15	113.6	18.0	75	172.8	27.4	35	232.1	36.8	95	291.4	46.1
56	55.3	08.8	16	114.6	18.1	76	173.8	27.5	36	233.1	36.9	96	292.4	46.3
57	56.3	08.9	17	115.6	18.3	77	174.8	27.7	37	234.1	37.1	97	293.3	46.5
58	57.3	09.1	18	116.5	18.5	78	175.8	27.8	38	235.1	37.2	98	294.3	46.6
59	58.3	09.2	19	117.5	18.6	79	176.8	28.0	39	236.1	37.4	99	295.3	46.8
60	59.3	09.4	20	118.5	18.8	80	177.8	28.2	40	237.0	37.5	300	296.3	6.9
Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat	Diſt	Dep.	Lat.

D d for 81 Degrees.

Difference of Latitude and Departure for 10 Degrees.

Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.
1	01.0	00.2	61	60.1	10.6	121	119.2	21.0	181	178.2	31.4	241	237.3	41.8
2	02.0	00.3	62	61.1	10.8	22	120.1	21.2	82	179.2	31.6	42	238.3	42.0
3	03.0	00.5	63	62.0	10.9	23	121.1	21.3	83	180.2	31.7	43	239.3	42.1
4	03.9	00.7	64	63.0	11.1	24	122.1	21.5	84	181.2	31.9	44	240.3	42.3
5	04.9	00.9	65	64.0	11.2	25	123.1	21.7	85	182.2	32.1	45	241.3	42.5
6	05.9	01.0	66	65.0	11.4	26	124.1	21.8	86	183.2	32.3	46	242.3	42.7
7	06.9	01.2	67	66.0	11.6	27	125.1	22.0	87	184.2	32.4	47	243.2	42.8
8	07.9	01.4	68	67.0	11.8	28	126.1	22.2	88	185.1	32.6	48	244.2	43.0
9	08.9	01.6	69	68.0	12.0	29	127.0	22.4	89	186.1	32.8	49	245.2	43.2
10	09.8	01.7	70	68.9	12.1	30	128.0	22.5	90	187.1	32.9	50	246.2	43.4
11	10.8	01.9	71	69.9	12.3	131	129.0	22.7	191	188.1	33.1	251	247.2	43.5
12	11.8	02.1	72	70.9	12.5	32	130.0	22.9	92	189.1	33.3	52	248.2	43.7
13	12.8	02.3	73	71.9	12.7	33	131.0	23.1	93	190.1	33.5	53	249.2	43.9
14	13.8	02.4	74	72.9	12.8	34	132.0	23.2	94	191.0	33.6	54	250.1	44.0
15	14.8	02.6	75	73.9	13.0	35	132.9	23.4	95	192.0	33.8	55	251.1	44.2
16	15.8	02.8	76	74.8	13.2	36	133.9	23.6	96	193.0	34.0	56	252.1	44.4
17	16.7	02.9	77	75.8	13.4	37	134.9	23.8	97	194.0	34.2	57	253.1	44.6
18	17.7	03.1	78	76.8	13.5	38	135.9	23.9	98	195.0	34.3	58	254.1	44.7
19	18.7	03.3	79	77.8	13.7	39	136.9	24.1	99	196.0	34.5	59	255.1	44.9
20	19.7	03.5	80	78.8	13.9	40	137.9	24.3	200	197.0	34.7	60	256.0	45.1
21	20.7	03.6	81	79.8	14.0	141	138.9	24.4	201	197.9	34.9	261	257.0	45.3
22	21.7	03.8	82	80.8	14.2	42	139.8	24.6	02	198.9	35.0	62	258.0	45.4
23	22.7	04.0	83	81.7	14.4	43	140.8	24.8	03	199.9	35.2	63	259.0	45.6
24	23.6	04.2	84	82.7	14.6	44	141.8	25.0	04	200.9	35.4	64	260.0	45.8
25	24.6	04.3	85	83.7	14.7	45	142.8	25.1	05	201.9	35.5	65	261.0	46.0
26	25.6	04.5	86	84.7	14.9	46	143.8	25.3	06	202.9	35.7	66	262.0	46.1
27	26.6	04.7	87	85.7	15.1	47	144.8	25.5	07	203.9	35.9	67	262.9	46.3
28	27.6	04.9	88	86.7	15.3	48	145.7	25.7	08	204.9	36.1	68	263.9	46.5
29	28.6	05.0	89	87.6	15.4	49	146.7	25.8	09	205.8	36.2	69	264.9	46.6
30	29.5	05.2	90	88.6	15.6	50	147.7	26.0	10	206.8	36.4	70	265.9	46.8
31	30.5	05.4	91	89.6	15.8	151	148.7	26.2	211	207.8	36.6	271	266.9	47.0
32	31.5	05.5	92	90.6	16.0	52	149.7	26.4	12	208.8	36.8	72	267.9	47.2
33	32.5	05.7	93	91.6	16.1	53	150.7	26.5	13	209.8	36.9	73	268.9	47.3
34	33.5	05.9	94	92.6	16.3	54	151.7	26.7	14	210.7	37.1	74	269.8	47.5
35	34.5	06.1	95	93.6	16.5	55	152.6	26.9	15	211.7	37.3	75	270.8	47.7
36	35.5	06.2	96	94.5	16.6	56	153.6	27.1	16	212.7	37.5	76	271.8	47.9
37	36.4	06.4	97	95.5	16.8	57	154.6	27.2	17	213.7	37.6	77	272.8	48.0
38	37.4	06.6	98	96.5	17.0	58	155.6	27.4	18	214.7	37.8	78	273.8	48.2
39	38.4	06.8	99	97.5	17.2	59	156.6	27.6	19	215.7	38.0	79	274.8	48.4
40	39.4	06.9	100	98.5	17.3	60	157.6	27.7	20	216.7	38.1	80	275.7	48.6
41	40.4	07.1	101	99.5	17.5	161	158.6	27.9	221	217.6	38.3	281	276.7	48.7
42	41.4	07.3	02	100.4	17.7	62	159.5	28.1	22	218.6	38.5	82	277.7	48.9
43	42.3	07.5	03	101.4	17.9	63	160.5	28.3	23	219.6	38.7	83	278.7	49.1
44	43.3	07.6	04	102.4	18.0	64	161.5	28.4	24	220.6	38.8	84	279.7	49.2
45	44.3	07.8	05	103.4	18.2	65	162.5	28.6	25	221.6	39.0	85	280.7	49.4
46	45.3	08.0	06	104.4	18.4	66	163.5	28.8	26	222.6	39.2	86	281.6	49.6
47	46.3	08.1	07	105.4	18.6	67	164.5	29.0	27	223.5	39.4	87	282.6	49.8
48	47.3	08.3	08	106.4	18.7	68	165.4	29.1	28	224.5	39.5	88	283.6	49.9
49	48.3	08.5	09	107.3	18.9	69	166.4	29.3	29	225.5	39.7	89	284.6	50.1
50	49.2	08.7	10	108.3	19.1	70	167.4	29.5	30	226.5	39.9	90	285.6	50.3
51	50.2	08.8	111	109.3	19.2	171	168.4	29.7	231	227.5	40.1	291	286.6	50.5
52	51.2	09.0	12	110.3	19.4	72	169.4	29.8	32	228.5	40.2	92	287.6	50.6
53	52.2	09.2	13	111.3	19.6	73	170.4	30.0	33	229.5	40.4	93	288.5	50.8
54	53.2	09.4	14	112.3	19.8	74	171.4	30.2	34	230.4	40.6	94	289.5	51.0
55	54.2	09.5	15	113.3	19.9	75	172.3	30.3	35	231.4	40.7	95	290.5	51.2
56	55.1	09.7	16	114.2	20.1	76	173.3	30.5	36	232.4	40.9	96	291.5	51.3
57	56.1	09.9	17	115.2	20.3	77	174.3	30.7	37	233.4	41.1	97	292.5	51.5
58	57.1	10.1	18	116.2	20.5	78	175.3	30.9	38	234.4	41.3	98	293.5	51.7
59	58.1	10.2	19	117.2	20.6	79	176.3	31.0	39	235.4	41.4	99	294.5	51.8
60	59.1	10.4	20	118.2	20.8	80	177.3	31.2	40	236.4	41.6	300	295.4	52.0
Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep	Lat.

for 80 Degrees.

Difference of Latitude and Departure for 11 Degrees.

Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.
1	01.0	00.2	61	59.9	11.6	121	118.8	23.1	181	177.7	34.5	241	236.6	46.0
2	02.0	00.4	62	60.9	11.8	22	119.8	23.3	82	178.6	34.7	42	237.5	46.2
3	02.9	00.6	63	61.8	12.0	23	120.7	23.5	83	179.6	34.9	43	238.5	46.4
4	03.9	00.8	64	62.8	12.2	24	121.7	23.7	84	180.6	35.1	44	239.5	46.6
5	04.9	01.0	65	63.8	12.4	25	122.7	23.9	85	181.6	35.3	45	240.5	46.7
6	05.9	01.1	66	64.8	12.6	26	123.7	24.0	86	182.6	35.5	46	241.5	47.0
7	06.9	01.3	67	65.8	12.8	27	124.7	24.2	87	183.6	35.7	47	242.5	47.1
8	07.9	01.5	68	66.7	13.0	28	125.6	24.4	88	184.5	35.9	48	243.4	47.3
9	08.8	01.7	69	67.7	13.2	29	126.6	24.6	89	185.5	36.1	49	244.4	47.5
10	09.8	01.9	70	68.7	13.4	30	127.6	24.8	90	186.5	36.3	50	245.4	47.7
11	10.8	02.1	71	69.7	13.5	131	128.6	25.0	191	187.5	36.4	251	246.4	47.9
12	11.8	02.3	72	70.7	13.7	32	129.6	25.2	92	188.5	36.6	52	247.4	48.1
13	12.8	02.5	73	71.7	13.9	33	130.6	25.4	93	189.4	36.8	53	248.3	48.3
14	13.7	02.7	74	72.6	14.1	34	131.5	25.6	94	190.4	37.0	54	249.3	48.5
15	14.7	02.9	75	73.6	14.3	35	132.5	25.8	95	191.4	37.2	55	250.3	48.7
16	15.7	03.1	76	74.6	14.5	36	133.5	25.9	96	192.4	37.4	56	251.3	48.8
17	16.7	03.2	77	75.6	14.7	37	134.5	26.1	97	193.4	37.6	57	252.3	49.0
18	17.7	03.4	78	76.6	14.9	38	135.5	26.3	98	194.4	37.8	58	253.2	49.2
19	18.7	03.6	79	77.5	15.1	39	136.4	26.5	99	195.4	38.0	59	254.2	49.4
20	19.6	03.8	80	78.5	15.3	40	137.4	26.7	200	196.3	38.2	60	255.2	49.6
21	20.6	04.0	81	79.5	15.5	141	138.4	26.9	201	197.3	38.4	261	256.2	49.8
22	21.6	04.2	82	80.5	15.6	42	139.4	27.1	02	198.3	38.5	62	257.2	50.0
23	22.6	04.4	83	81.5	15.8	43	140.4	27.3	03	199.3	38.7	63	258.2	50.2
24	23.6	04.6	84	82.5	16.0	44	141.3	27.5	04	200.2	38.9	64	259.1	50.4
25	24.5	04.8	85	83.4	16.2	45	142.3	27.7	05	201.2	39.1	65	260.1	50.6
26	25.5	05.0	86	84.4	16.4	46	143.3	27.9	06	202.2	39.3	66	261.1	50.8
27	26.5	05.2	87	85.4	16.6	47	144.3	28.0	07	203.2	39.5	67	262.1	50.9
28	27.5	05.3	88	86.4	16.8	48	145.3	28.2	08	204.2	39.7	68	263.1	51.1
29	28.5	05.5	89	87.4	17.0	49	146.3	28.4	09	205.2	39.9	69	264.0	51.3
30	29.4	05.7	90	88.3	17.2	50	147.2	28.6	10	206.1	40.1	70	265.0	51.5
31	30.4	05.9	91	89.3	17.4	151	148.2	28.8	211	207.1	40.3	271	266.0	51.7
32	31.4	06.1	92	90.3	17.6	52	149.2	29.0	12	208.1	40.4	72	267.0	51.9
33	32.4	06.3	93	91.3	17.7	53	150.2	29.2	13	209.1	40.6	73	268.0	52.1
34	33.4	06.5	94	92.3	17.9	54	151.2	29.4	14	210.1	41.8	74	269.0	52.3
35	34.4	06.7	95	93.3	18.1	55	152.1	29.6	15	211.0	41.0	75	269.9	52.5
36	35.3	06.9	96	94.2	18.3	56	153.1	29.8	16	212.0	41.2	76	270.9	52.7
37	36.3	07.1	97	95.2	18.5	57	154.1	30.0	17	213.0	41.4	77	271.9	52.9
38	37.3	07.3	98	96.2	18.7	58	155.1	30.1	18	214.0	41.6	78	272.9	53.0
39	38.3	07.4	99	97.2	18.9	59	156.1	30.3	19	215.0	41.8	79	273.9	53.2
40	39.3	07.6	100	98.2	19.1	60	157.1	30.5	20	215.9	42.0	80	274.8	53.4
41	40.2	07.8	101	99.1	19.3	161	158.0	30.7	221	216.9	42.2	281	275.8	53.6
42	41.2	08.0	02	100.1	19.5	62	159.0	30.9	22	217.9	42.4	82	276.8	53.8
43	42.2	08.2	03	101.1	19.7	63	160.0	31.1	23	218.9	42.5	83	277.8	54.0
44	43.2	08.4	04	102.1	19.8	64	161.0	31.3	24	219.9	42.7	84	278.8	54.2
45	44.2	08.6	05	103.1	20.0	65	162.0	31.5	25	220.9	42.9	85	279.8	54.4
46	45.2	08.8	06	104.0	20.2	66	162.9	31.7	26	221.8	43.1	86	280.7	54.6
47	46.1	09.0	07	105.0	20.4	67	163.9	31.9	27	222.8	43.3	87	281.7	54.8
48	47.1	09.2	08	106.0	20.6	68	164.9	32.1	28	223.8	43.5	88	282.7	55.0
49	48.1	09.3	09	107.0	20.8	69	165.9	32.2	29	224.8	43.7	89	283.7	55.2
50	49.1	09.5	10	108.0	21.0	70	166.9	32.4	30	225.8	43.9	90	284.7	55.3
51	50.1	09.7	111	109.0	21.2	171	167.9	32.6	231	226.7	44.1	291	285.6	55.5
52	51.0	09.9	12	109.9	21.4	72	168.8	32.8	32	227.7	44.3	92	286.6	55.7
53	52.0	10.1	13	110.9	21.6	73	169.8	33.0	33	228.7	44.5	93	287.6	55.9
54	53.0	10.3	14	111.9	21.8	74	170.8	33.2	34	229.7	44.6	94	288.6	56.0
55	54.0	10.5	15	112.9	21.9	75	171.8	33.4	35	230.7	44.8	95	289.6	56.3
56	55.0	10.7	16	113.9	22.1	76	172.8	33.6	36	231.7	45.0	96	290.5	56.5
57	56.0	10.9	17	114.8	22.3	77	173.7	33.8	37	232.6	45.2	97	291.5	56.7
58	56.9	11.1	18	115.8	22.5	78	174.7	34.0	38	233.6	45.4	98	292.5	56.5
59	57.9	11.3	19	116.8	22.7	79	175.7	34.2	39	234.6	45.6	99	293.5	57.0
60	58.9	11.4	20	117.8	22.9	80	176.7	34.3	40	235.6	45.8	300	294.5	57.2
Diſt	Dep.	Lat	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.

for 79 Degrees.

Difference of Latitude and Departure for 12 Degrees.

Diſt	Lat	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.
1	01.0	00.2	61	59.7	12.7	121	118.3	25.2	181	177.0	37.6	241	235.7	50.1
2	02.0	00.4	62	60.6	12.9	22	119.3	25.4	82	178.0	37.9	42	236.7	50.3
3	02.9	00.6	63	61.6	13.1	23	120.3	25.6	83	179.0	38.1	43	237.7	50.5
4	03.9	00.8	64	62.6	13.3	24	121.3	25.8	84	180.0	38.3	44	238.6	50.8
5	04.9	01.0	65	63.6	13.5	25	122.3	26.0	85	180.9	38.5	45	239.6	51.0
6	05.9	01.2	66	64.5	13.7	26	123.2	26.2	86	181.9	38.7	46	240.6	51.2
7	06.8	01.5	67	65.5	13.9	27	124.2	26.4	87	182.9	38.9	47	241.6	51.4
8	07.8	01.7	68	66.5	14.1	28	125.2	26.6	88	183.9	39.1	48	242.5	51.6
9	08.8	01.9	69	67.5	14.4	29	126.2	26.8	89	184.8	39.3	49	243.5	51.8
10	09.8	02.1	70	68.5	14.6	30	127.1	27.0	90	185.8	39.5	50	244.5	52.0
11	10.8	02.3	71	69.4	14.8	131	128.1	27.2	191	186.8	39.7	251	245.5	52.2
12	11.7	02.5	72	70.4	15.0	32	129.1	27.5	92	187.8	39.9	52	246.5	52.4
13	12.7	02.7	73	71.4	15.2	33	130.1	27.7	93	188.8	40.1	53	247.4	52.6
14	13.7	02.9	74	72.4	15.4	34	131.1	27.9	94	189.7	40.4	54	248.4	52.8
15	14.7	03.1	75	73.4	15.6	35	132.0	28.1	95	190.7	40.6	55	249.4	53.0
16	15.6	03.3	76	74.3	15.8	36	133.0	28.3	96	191.7	40.8	56	250.4	53.2
17	16.6	03.5	77	75.3	16.0	37	134.0	28.5	97	192.7	41.0	57	251.3	53.5
18	17.6	03.7	78	76.3	16.2	38	135.0	28.7	98	193.6	41.2	58	252.3	53.7
19	18.6	04.0	79	77.3	16.4	39	135.9	28.9	99	194.6	41.4	59	253.3	53.9
20	19.6	04.2	80	78.2	16.6	40	136.9	29.1	200	195.6	41.6	60	254.3	54.1
21	20.5	04.4	81	79.2	16.8	141	137.9	29.3	201	196.6	41.8	261	255.3	54.3
22	21.5	04.6	82	80.2	17.1	42	138.9	29.5	02	197.6	42.0	62	256.2	54.5
23	22.5	04.8	83	81.2	17.3	43	139.9	29.7	03	198.5	42.2	63	257.2	54.7
24	23.5	05.0	84	82.2	17.5	44	140.8	30.0	04	199.5	42.4	64	258.2	54.9
25	24.5	05.2	85	83.1	17.7	45	141.8	30.2	05	200.5	42.6	65	259.2	55.1
26	25.4	05.4	86	84.1	17.9	46	142.8	30.4	06	201.5	42.8	66	260.1	55.3
27	26.4	05.6	87	85.1	18.0	47	143.8	30.6	07	202.4	43.1	67	261.1	55.5
28	27.4	05.8	88	86.1	18.3	48	144.7	30.8	08	203.4	43.3	68	262.1	55.7
29	28.4	06.0	89	87.0	18.5	49	145.7	31.0	09	204.4	43.5	69	263.1	56.0
30	29.3	06.2	90	88.0	18.7	50	146.7	31.2	10	205.4	43.7	70	264.1	56.2
31	30.3	06.4	91	89.0	18.9	151	147.7	31.4	211	206.4	43.9	271	265.0	56.4
32	31.3	06.7	92	90.0	19.1	52	148.7	31.6	12	207.3	44.1	72	266.0	56.6
33	32.3	06.9	93	91.0	19.3	53	149.6	31.8	13	208.3	44.3	73	267.0	56.8
34	33.3	07.1	94	91.9	19.6	54	150.6	32.0	14	209.3	44.5	74	268.0	57.0
35	34.2	07.3	95	92.9	19.8	55	151.6	32.2	15	210.3	44.7	75	269.0	57.2
36	35.2	07.5	96	93.9	20.0	56	152.6	32.4	16	211.2	44.9	76	269.9	57.4
37	36.2	07.7	97	94.9	20.2	57	153.5	32.7	17	212.2	45.1	77	270.9	57.6
38	37.2	07.9	98	95.8	20.4	58	154.5	32.9	18	213.2	45.3	78	271.9	57.8
39	38.1	08.1	99	96.8	20.6	59	155.5	33.1	19	214.2	45.6	79	272.9	58.0
40	39.1	08.3	100	97.8	20.8	60	156.5	33.3	20	215.2	45.8	80	273.8	58.2
41	40.1	08.5	101	98.8	21.0	161	157.5	33.5	221	216.1	46.0	281	274.8	58.4
42	41.1	08.7	02	99.8	21.2	62	158.4	33.7	22	217.1	46.2	82	275.8	58.7
43	42.1	08.9	03	100.7	21.4	63	159.4	33.9	23	218.1	46.4	83	276.8	58.9
44	43.0	09.2	04	101.7	21.6	64	160.4	34.1	24	219.1	46.6	84	277.8	59.1
45	44.0	09.4	05	102.7	21.8	65	161.4	34.3	25	220.1	46.8	85	278.7	59.3
46	45.0	09.6	06	103.7	22.0	66	162.3	34.5	26	221.0	47.0	86	279.7	59.5
47	46.0	09.8	07	104.6	22.3	67	163.3	34.7	27	222.0	47.2	87	280.7	59.7
48	46.9	10.0	08	105.6	22.5	68	164.3	34.9	28	223.0	47.4	88	281.7	59.9
49	47.9	10.2	09	106.6	22.7	69	165.3	35.2	29	224.0	47.6	89	282.6	60.1
50	48.9	10.4	10	107.6	22.9	70	166.3	35.4	30	224.9	47.8	90	283.6	60.3
51	49.9	10.6	111	108.6	23.1	171	167.2	35.6	231	225.9	48.0	291	284.6	60.5
52	50.9	10.8	12	109.5	23.3	72	168.2	35.8	32	226.9	48.3	92	285.6	60.7
53	51.8	11.0	13	110.5	23.5	73	169.2	36.0	33	227.9	48.5	93	286.6	60.9
54	52.8	11.2	14	111.5	23.7	74	170.2	36.2	34	228.9	48.7	94	287.5	61.2
55	53.8	11.4	15	112.5	23.9	75	171.2	36.4	35	229.8	48.9	95	288.5	61.4
56	54.8	11.6	16	113.4	24.1	76	172.1	36.6	36	230.8	49.1	96	289.5	61.6
57	55.7	11.9	17	114.4	24.3	77	173.1	36.8	37	231.8	49.3	97	290.5	61.8
58	56.7	12.1	18	115.4	24.5	78	174.1	37.0	38	232.8	49.5	98	291.4	62.0
59	57.7	12.3	19	116.4	24.8	79	175.1	37.2	39	233.7	49.7	99	292.4	62.2
60	58.7	12.5	20	117.4	25.0	80	176.0	37.4	40	234.7	49.9	300	293.4	62.4
Diſt	Dep.	Lat.	Diſt	Dep	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.

for 78 Degrees.

Difference of Latitude and Departure for 13 Degree.

Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.
1	01.0	00.2	61	59.4	13.7	121	117.9	27.2	181	176.4	40.7	241	234.8	54.2
2	01.9	00.4	62	60.4	13.9	22	118.9	27.4	82	177.3	40.9	42	235.8	54.4
3	02.9	00.7	63	61.4	14.2	23	119.8	27.7	83	178.3	41.2	43	236.8	55.7
4	03.9	00.9	64	62.4	14.4	24	120.8	27.9	84	179.3	41.4	44	237.8	55.9
5	04.9	01.1	65	63.3	14.6	25	121.8	28.1	85	180.3	41.6	45	238.7	55.1
6	05.8	01.3	66	64.3	14.8	26	122.8	28.3	86	181.2	41.8	46	239.7	55.3
7	06.8	01.6	67	65.3	15.1	27	123.7	28.6	87	182.2	42.1	47	240.7	55.6
8	07.8	01.8	68	66.3	15.3	28	124.7	28.8	88	183.2	42.3	48	241.6	55.8
9	08.8	02.0	69	67.2	15.5	29	125.7	29.0	89	184.2	42.5	49	242.6	56.0
10	09.7	02.2	70	68.2	15.7	30	1 6.7	29.2	90	185.1	42.7	50	243.6	56.2
11	10.7	92.5	71	69.2	16.0	131	127.6	29.5	191	186.1	43.0	251	244.6	56.5
12	11.7	02.7	72	70.2	16.2	32	128.6	29.7	92	187.1	43.2	52	245.5	56.7
13	12.7	02.9	73	71.1	16.4	33	129.6	29.9	93	188.1	43.4	53	246.5	56.9
14	13.6	03.1	74	72.1	16.6	34	130.6	30.1	94	189.0	43.6	54	247.5	57.1
15	4.6	03.4	75	73.1	16.9	35	131.5	30.4	95	190.0	43.9	55	248.5	57.4
16	15.6	03.6	76	74.1	17.1	36	132.5	30.6	96	191.0	44.1	56	249.4	57.6
17	16.6	03.8	77	75.0	17.3	37	133.5	30.8	97	192.0	44.3	57	250.4	57.8
18	17.5	04.0	78	76.0	17.5	38	134.5	31.0	98	192.9	44.5	58	251.4	58.0
19	18.5	04.3	79	77.0	17.8	39	135.4	31.3	99	193.9	44.8	59	252.4	58.3
20	19.5	04.5	80	78.0	18.0	40	136.4	31.5	200	194.9	45.0	60	253.3	58.5
21	20.5	04.7	81	78.9	18.2	141	137.4	31.7	201	195.9	45.2	261	254.3	58.7
22	21.4	04.9	82	79.9	18.4	42	138.4	31.9	02	196.8	45.4	62	255.3	58.9
23	22.4	05.2	83	80.9	18.7	43	139.3	32.2	03	197.8	45.7	63	256.3	59.2
24	23.4	05.4	84	81.8	18.9	44	140.3	32.4	04	198.8	45.9	64	257.2	59.4
25	24.4	05.6	85	82.8	19.1	45	141.3	32.6	05	199.7	46.1	65	258.2	59.6
26	25.3	05.8	86	83.8	19.3	46	142.3	32.8	06	200.7	46.3	66	259.2	59.8
27	26.3	06.1	87	84.8	19.6	47	143.2	33.1	07	201.7	46.6	67	260.2	60.1
28	27.3	06.3	88	85.7	19.8	48	144.2	33.3	08	202.7	46.8	68	261.1	60.3
29	28.3	06.5	89	86.7	20.0	49	145.2	33.5	09	203.6	47.0	69	262.1	60.5
30	29.2	06.7	90	87.7	20.2	50	146.2	33.7	10	204.6	47.2	70	263.1	60.7
31	30.2	07.0	91	88.7	20.5	151	147.1	34.0	211	205.6	47.5	271	264.1	61.0
32	31.2	07.2	92	89.6	20.7	52	148.1	34.2	12	206.6	47.7	72	265.0	61.2
33	32.2	07.4	93	90.6	20.9	53	149.1	34.4	13	207.5	47.9	73	266.0	61.4
34	33.1	07.6	94	91.6	21.1	54	150.1	34.6	14	208.5	48.1	74	267.0	61.6
35	34.1	07.9	95	92.6	21.4	55	151.0	34.9	15	209.5	48.4	75	268.0	61.9
36	35.1	08.1	96	93.5	21.6	56	152.0	35.1	16	210.5	48.6	76	268.9	62.1
37	36.1	08.3	97	94.5	21.8	57	153.0	35.3	17	211.4	48.8	77	269.9	62.3
38	37.0	08.5	98	95.5	22.0	58	154.0	35.5	18	212.4	49.0	78	270.9	62.5
39	38.0	08.8	99	96.5	22.3	59	154.9	35.8	19	213.4	49.3	79	271.9	62.8
40	39.0	08.0	100	97.4	22.5	60	155.9	36.0	20	214.4	49.5	80	272.8	63.0
41	39.9	09.2	101	98.4	22.7	161	156.9	36.2	221	215.3	49.7	281	273.8	63.2
42	40.9	09.4	02	99.4	22.9	62	157.9	36.4	22	216.3	49.9	82	274.8	63.4
43	41.9	09.7	03	100.4	23.2	63	158.8	36.7	23	217.3	50.2	83	275.8	63.7
44	42.9	09.9	04	101.3	23.4	64	159.8	36.9	24	218.3	50.4	84	276.7	63.9
45	43.8	10.1	05	102.3	23.6	65	160.8	37.1	25	219.2	50.6	85	277.7	64.1
46	44.8	10.3	06	103.3	23.8	66	161.7	37.3	26	220.2	50.8	86	278.7	64.3
47	45.8	10.6	07	104.3	24.1	67	162.7	37.6	27	221.2	51.1	87	279.6	64.6
48	46.8	10.8	08	105.2	24.3	68	163.7	37.8	28	222.2	51.3	88	280.6	64.8
49	47.7	11.0	09	106.2	24.5	69	164.7	38.0	29	223.1	51.5	89	281.6	65.0
50	48.7	11.2	10	107.2	24.7	70	165.6	38.2	30	224.1	51.7	90	282.6	65.2
51	49.7	11.5	111	108.2	25.0	171	166.6	38.5	231	225.1	52.0	291	283.5	65.5
52	50.7	11.7	12	109.1	25.2	72	167.6	38.7	32	226.1	52.2	92	284.5	65.7
53	51.6	11.9	13	110.1	25.4	73	168.6	38.9	33	227.0	52.4	93	285.5	65.9
54	52.6	12.1	14	111.1	25.6	74	169.5	39.1	34	228.0	52.6	94	286.5	66.1
55	53.6	12.4	15	112.1	25.9	75	170.5	39.4	35	229.0	52.9	95	287.4	66.4
56	54.6	12.6	16	113.0	26.1	76	171.5	39.6	36	230.0	53.1	96	288.4	66.6
57	55.5	12.8	17	114.0	26.3	77	172.5	39.8	37	230.9	53.3	97	289.4	66.8
58	56.5	13.0	18	115.0	26.5	78	173.4	40.0	38	231.9	53.5	98	290.4	67.0
59	57.5	13.3	19	116.0	26.8	79	174.4	40.3	39	232.9	53.8	99	291.3	67.3
60	58.5	13.5	20	116.9	27.0	80	175.4	40.5	40	233.9	54.0	300	292.3	67.5
Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.

for 77 Degrees.

Difference of Latitude and Departure for 14 Degrees.

Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.
1	01.0	00.2	61	59.2	14.8	121	117.4	29.3	181	175.6	43.8	241	233.8	58.3
2	01.9	00.5	62	60.2	15.0	22	118.4	29.5	82	176.6	44.0	42	234.8	58.6
3	02.9	00.7	63	61.1	15.2	23	119.3	29.8	83	177.6	44.3	43	235.8	58.8
4	03.9	01.0	64	62.1	15.5	24	120.3	30.0	84	178.5	44.5	44	236.7	59.0
5	04.9	01.2	65	63.1	15.7	25	121.3	30.2	85	179.5	44.8	45	237.7	59.3
6	05.8	01.5	66	64.0	16.0	26	122.3	30.5	86	180.5	45.0	46	238.7	59.5
7	06.8	01.7	67	65.0	16.2	27	123.2	30.7	87	181.4	45.3	47	239.7	59.8
8	07.8	01.9	68	66.0	16.5	28	124.2	31.0	88	182.4	45.5	48	240.6	60.0
9	08.7	02.2	69	66.9	16.7	29	125.2	31.2	89	183.4	45.7	49	241.6	60.3
10	09.7	02.4	70	67.9	16.9	30	126.1	31.5	90	184.4	46.0	50	242.6	60.5
11	10.7	02.7	71	68.9	17.2	131	127.1	31.7	191	185.3	46.2	251	243.5	60.7
12	11.6	02.9	72	69.9	17.4	32	128.1	31.9	92	186.3	46.5	52	244.5	61.0
13	12.6	03.1	73	70.8	17.7	33	129.0	32.2	93	187.3	46.7	53	245.5	61.2
14	13.6	03.4	74	71.8	17.9	34	130.0	32.4	94	188.2	46.9	54	246.4	61.5
15	14.6	03.6	75	72.8	18.1	35	131.0	32.7	95	189.2	47.2	55	247.4	61.7
16	15.5	03.9	76	73.7	18.4	36	132.0	32.9	96	190.2	47.4	56	248.4	62.0
17	16.5	04.1	77	74.7	18.6	37	132.9	33.2	97	191.1	47.7	57	249.4	62.2
18	17.5	04.4	78	75.7	18.9	38	133.9	33.4	98	192.1	47.9	58	250.3	62.4
19	18.4	04.6	79	76.7	19.1	39	134.9	33.6	99	193.1	48.2	59	251.3	62.7
20	19.4	04.8	80	77.6	19.4	40	135.9	33.9	200	194.1	48.4	60	252.3	62.9
21	20.4	05.1	81	78.6	19.6	141	136.8	34.1	201	195.0	48.6	261	253.2	63.2
22	21.3	05.3	82	79.6	19.8	42	137.8	34.4	02	196.0	48.9	62	254.2	63.4
23	22.3	05.6	83	80.5	20.1	43	138.7	34.6	03	197.0	49.1	63	255.2	63.6
24	23.3	05.8	84	81.5	20.3	44	139.7	34.8	04	197.9	49.4	64	256.2	63.9
25	24.3	06.0	85	82.5	20.6	45	140.7	35.1	05	198.9	49.6	65	257.1	64.1
26	25.2	06.3	86	83.4	20.8	46	141.7	35.3	06	199.9	49.9	66	258.1	64.4
27	26.2	06.5	87	84.4	21.1	47	142.6	35.6	07	200.8	50.1	67	259.1	64.6
28	27.2	06.8	88	85.4	21.3	48	143.6	35.8	08	201.8	50.3	68	260.0	64.9
29	28.1	07.0	89	86.4	21.5	49	144.6	36.1	09	202.8	50.6	69	261.0	65.1
30	29.1	07.3	90	87.3	21.8	50	145.5	36.3	10	203.8	50.8	70	262.0	65.3
31	30.1	07.5	91	88.3	22.6	151	146.5	36.5	211	204.7	51.1	271	262.9	65.6
32	31.0	07.7	92	89.3	22.3	52	147.5	36.8	12	205.7	51.3	72	263.9	65.8
33	32.0	08.0	93	90.2	22.5	53	148.5	37.0	13	206.7	51.5	73	264.9	66.1
34	33.0	08.2	94	91.2	22.7	54	149.4	37.3	14	207.6	51.8	74	265.9	66.3
35	34.0	08.5	95	92.2	23.0	55	150.4	37.5	15	208.6	52.0	75	266.8	66.5
36	34.9	08.7	96	93.1	23.2	56	151.4	37.7	16	209.6	52.3	76	267.8	66.8
37	35.9	09.0	97	94.1	23.5	57	152.3	38.0	17	210.5	52.5	77	268.8	67.0
38	36.9	09.2	98	95.1	23.7	58	153.3	38.2	18	211.5	52.8	78	269.7	67.3
39	37.8	09.4	99	96.1	24.0	59	154.3	38.5	19	212.5	53.0	79	270.7	67.5
40	38.8	09.7	100	97.0	24.2	60	155.2	38.7	20	213.5	53.2	80	271.7	67.8
41	39.8	09.9	101	98.0	24.4	161	156.2	39.0	221	214.4	53.5	281	272.6	68.0
42	40.8	10.2	02	99.0	24.7	62	157.2	39.2	22	215.4	53.7	82	273.6	68.2
43	41.7	10.4	03	99.9	24.9	63	158.2	39.4	23	216.4	54.0	83	274.6	68.5
44	42.7	10.6	04	100.9	25.2	64	159.1	39.7	24	217.3	54.2	84	275.6	68.7
45	43.7	10.9	05	101.9	25.4	65	160.1	39.9	25	218.3	54.4	85	276.5	69.0
46	44.6	11.1	06	102.8	25.7	66	161.1	40.2	26	219.3	54.7	86	277.5	69.2
47	45.6	11.4	07	103.8	25.9	67	162.0	40.4	27	220.3	54.9	87	278.5	69.5
48	46.6	11.6	08	104.8	26.1	68	163.0	40.7	28	221.2	55.2	88	279.4	69.7
49	47.5	11.9	09	105.8	26.4	69	164.0	40.9	29	222.2	55.4	89	280.4	69.9
50	48.5	12.1	10	106.7	26.6	70	164.9	41.1	30	223.2	55.7	90	281.4	70.2
51	49.5	12.3	111	107.7	26.9	171	165.9	41.4	231	224.1	55.9	291	282.3	70.4
52	50.5	12.6	12	108.7	27.1	72	166.9	41.6	32	225.1	56.1	92	283.3	70.7
53	51.4	12.8	13	109.6	27.3	73	167.9	41.9	33	226.1	56.4	93	284.3	70.9
54	52.4	13.1	14	110.6	27.6	74	168.8	42.1	34	227.0	56.6	94	285.3	71.1
55	53.4	13.3	15	111.6	27.8	75	169.8	42.3	35	228.0	56.9	95	286.2	71.4
56	54.3	13.6	16	112.6	28.1	76	170.8	42.7	36	229.0	57.1	96	287.2	71.6
57	55.3	13.8	17	113.5	28.3	77	171.7	42.8	37	230.0	57.4	97	288.2	71.9
58	56.3	14.0	18	114.5	28.6	78	172.7	43.1	38	230.9	57.6	98	289.1	72.1
59	57.2	14.3	19	115.5	28.8	79	173.7	43.3	39	231.9	57.8	99	290.1	72.4
60	58.2	14.5	20	116.4	29.0	80	174.6	43.6	40	232.9	58.1	300	291.1	72.6
Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.

for 76 Degrees.

Difference of Latitude and Departure for 15 Degrees.

Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.
1	01.0	00.3	61	58.9	15.8	121	116.9	31.3	181	174.8	46.8	241	232.8	62.4
2	01.9	00.5	62	59.9	16.0	22	117.8	31.6	82	175.8	47.1	42	233.7	62.6
3	02.9	00.8	63	60.9	16.3	23	118.8	31.8	83	176.8	47.4	43	234.7	62.9
4	03.9	01.0	64	61.8	16.6	24	119.8	32.1	84	177.7	47.6	44	235.7	63.1
5	04.8	01.3	65	62.8	16.8	25	120.7	32.4	85	178.7	47.9	45	236.6	63.4
6	05.8	01.6	66	63.7	17.1	26	121.7	32.6	86	179.7	48.1	46	237.6	63.7
7	06.8	01.8	67	64.7	17.3	27	122.7	32.9	87	180.6	48.4	47	238.6	63.9
8	07.7	02.1	68	65.7	17.6	28	123.6	33.1	88	181.6	48.7	48	239.5	64.2
9	08.7	02.3	69	66.6	17.9	29	124.6	33.4	89	182.6	48.9	49	240.5	64.4
10	09.7	02.6	70	67.6	18.1	30	125.6	33.6	90	183.5	49.2	50	241.5	64.7
11	10.6	02.8	71	68.6	18.4	131	126.5	33.9	191	184.5	49.4	251	242.4	65.0
12	11.6	03.1	72	69.5	18.6	32	127.5	34.2	92	185.5	49.7	52	243.4	65.2
13	12.6	03.4	73	70.5	18.9	33	128.5	34.4	93	186.4	49.9	53	244.4	65.5
14	13.5	03.6	74	71.5	19.2	34	129.4	34.7	94	187.4	50.2	54	245.3	65.7
15	14.5	03.9	75	72.4	19.4	35	130.4	34.9	95	188.4	50.5	55	246.3	66.0
16	15.5	04.1	76	73.4	19.7	36	131.4	35.2	96	189.3	50.7	56	247.3	66.3
17	16.4	04.4	77	74.4	19.9	37	132.3	35.5	97	190.3	51.0	57	248.2	66.5
18	17.4	04.7	78	75.3	20.2	38	133.3	35.7	98	191.2	51.2	58	249.2	66.8
19	18.4	04.9	79	76.3	20.4	39	134.3	36.0	99	192.2	51.5	59	250.2	67.0
20	19.3	05.2	80	77.3	20.7	40	135.2	36.2	200	193.2	51.8	60	251.1	67.3
21	20.3	05.4	81	78.2	21.0	141	136.2	36.5	201	194.1	52.0	261	252.1	67.5
22	21.2	05.7	82	79.2	21.2	42	137.2	36.7	02	195.1	52.3	62	253.1	67.8
23	22.2	06.0	83	80.2	21.5	43	138.1	37.0	03	196.1	52.5	63	254.0	68.1
24	23.2	06.2	84	81.1	21.7	44	139.1	37.3	04	197.0	52.8	64	255.0	68.3
25	24.1	06.5	85	82.1	22.0	45	140.1	37.5	05	198.0	53.1	65	256.0	68.6
26	25.1	06.7	86	83.1	22.3	46	141.0	37.8	06	199.0	53.3	66	256.9	68.8
27	26.1	07.0	87	84.0	22.5	47	142.0	38.0	07	199.9	53.6	67	257.9	69.1
28	27.0	07.2	88	85.0	22.8	48	143.0	38.3	08	200.9	53.8	68	258.9	69.4
29	28.0	07.5	89	86.0	23.0	49	143.0	38.6	09	201.9	54.1	69	259.8	69.6
30	29.0	07.8	90	86.9	23.3	50	144.9	38.8	10	202.8	54.3	70	260.8	69.9
31	29.9	08.0	91	87.9	23.6	151	145.8	39.1	211	203.8	54.6	271	261.8	70.1
32	30.9	08.3	92	88.9	23.8	52	146.8	39.3	12	204.8	54.9	72	262.7	70.4
33	31.9	08.5	93	89.8	24.1	53	147.8	39.6	13	205.7	55.1	73	263.7	70.7
34	32.8	08.8	94	90.8	24.3	54	148.7	39.9	14	206.7	55.4	74	264.7	70.9
35	33.8	09.1	95	91.8	24.6	55	149.7	40.1	15	207.7	55.6	75	265.6	71.2
36	34.8	09.3	96	92.7	24.8	56	150.7	40.4	16	208.7	55.9	76	266.6	71.4
37	35.7	09.6	97	93.7	25.1	57	151.6	40.6	17	209.6	56.1	77	267.6	71.7
38	36.7	09.8	98	94.7	25.4	58	152.6	40.9	18	210.6	56.4	78	268.5	71.9
39	37.7	10.1	99	95.6	25.6	59	153.6	41.1	19	211.5	56.7	79	269.5	72.2
40	38.6	10.4	100	96.6	25.9	60	154.5	41.4	20	212.5	56.9	80	270.5	72.5
41	39.6	10.6	101	97.6	26.1	161	155.5	41.7	221	213.5	57.2	281	271.4	72.7
42	40.6	10.9	02	98.5	26.4	62	156.5	41.9	22	214.4	57.5	82	272.4	73.0
43	41.5	11.1	03	99.5	26.7	63	157.4	42.2	23	215.4	57.7	83	273.4	73.2
44	42.5	11.4	04	100.5	26.9	64	158.4	42.4	24	216.4	58.0	84	274.3	73.5
45	43.5	11.6	05	101.4	27.2	65	159.4	42.7	25	217.3	58.2	85	275.3	73.8
46	44.4	11.9	06	102.4	27.4	66	160.3	43.0	26	218.3	58.5	86	276.2	74.0
47	45.4	12.2	07	103.4	27.7	67	161.3	43.2	27	219.3	58.7	87	277.2	74.3
48	46.4	12.4	08	104.3	28.0	68	162.3	43.5	28	220.2	59.0	88	278.2	74.5
49	47.3	12.7	09	105.3	28.2	69	163.2	43.7	29	221.2	59.3	89	279.1	74.8
50	48.3	12.9	10	106.2	28.5	70	164.2	44.0	30	222.2	59.5	90	280.1	75.0
51	49.3	13.2	111	107.2	28.7	171	165.2	44.3	231	223.1	59.8	291	281.1	75.3
52	50.2	13.5	12	108.2	29.0	72	166.1	44.5	32	224.1	60.0	92	282.0	75.6
53	51.2	13.7	13	109.1	29.2	73	167.1	44.8	33	225.1	60.3	93	283.0	75.8
54	52.2	14.0	14	110.1	29.5	74	168.1	45.0	34	226.0	60.6	94	284.0	76.1
55	53.1	14.2	15	111.1	29.8	75	169.0	45.3	35	227.0	60.8	95	284.9	76.3
56	54.1	14.5	16	112.0	30.0	76	170.0	45.5	36	228.0	61.1	96	285.9	76.6
57	55.1	14.8	17	113.0	30.3	77	171.0	45.8	37	228.9	61.3	97	286.9	76.9
58	56.0	15.0	18	114.0	30.5	78	171.9	46.1	38	229.9	61.6	98	287.8	77.1
59	57.0	15.3	19	114.9	30.8	79	172.9	46.3	39	230.9	61.9	99	288.8	77.4
60	58.0	15.5	20	115.9	30.1	80	173.9	46.6	40	231.8	62.1	300	289.8	77.6
Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.

for 75 Degrees.

Difference of Latitude and Departure for 16 Degrees.

Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.
1	01.0	00.3	61	58.6	16.8	121	116.3	33.3	181	174.0	49.9	241	231.6	66.4
2	01.9	00.6	62	59.6	17.1	22	117.3	33.6	82	174.9	50.2	42	232.6	66.7
3	02.9	00.8	63	60.6	17.4	23	118.2	33.9	83	175.9	50.4	43	233.6	67.0
4	03.8	01.1	64	61.5	17.6	24	119.2	34.2	84	176.8	50.7	44	234.5	67.2
5	04.8	01.4	65	62.5	17.9	25	120.1	34.4	85	177.8	51.0	45	235.5	67.5
6	05.8	01.7	66	63.4	18.2	26	121.1	34.7	86	178.8	51.3	46	236.4	67.8
7	06.7	01.9	67	64.4	18.5	27	122.1	35.0	87	179.7	51.5	47	237.4	68.1
8	07.7	02.2	68	65.4	18.7	28	123.0	35.3	88	180.7	51.8	48	238.4	68.3
9	08.7	02.5	69	66.3	19.0	29	124.0	35.6	89	181.7	52.1	49	239.3	68.6
10	09.6	02.8	70	67.3	19.3	30	124.9	35.8	90	182.6	52.4	50	240.3	68.9
11	10.6	03.0	71	68.2	19.6	131	125.9	36.1	191	183.6	52.6	251	241.2	69.2
12	11.5	03.3	72	69.2	19.8	32	126.9	36.4	92	184.5	52.9	52	242.2	69.5
13	12.5	03.6	73	70.2	20.1	33	127.8	36.7	93	185.5	53.2	53	243.2	69.7
14	13.5	03.9	74	71.1	20.4	34	128.8	36.9	94	186.5	53.5	54	244.1	70.0
15	14.4	04.1	75	72.1	20.7	35	129.8	37.2	95	187.4	53.7	55	245.1	70.3
16	15.4	04.4	76	73.0	20.9	36	130.7	37.5	96	188.4	54.0	56	246.0	70.6
17	16.3	04.7	77	74.0	21.2	37	131.7	37.8	97	189.3	54.3	57	247.0	70.8
18	17.3	05.0	78	75.0	21.5	38	132.6	38.0	98	190.3	54.6	58	248.0	71.1
19	18.3	05.2	79	75.9	21.8	39	133.6	38.3	99	191.3	54.8	59	248.9	71.4
20	19.2	05.5	80	76.9	22.0	40	134.6	38.6	200	192.2	55.1	60	249.9	71.7
21	20.2	05.8	81	77.9	22.3	141	135.5	38.9	201	193.2	55.4	261	250.9	71.9
22	21.1	06.1	82	78.8	22.6	42	136.5	39.1	02	194.1	55.7	62	251.8	72.2
23	22.1	06.3	83	79.8	22.9	43	137.4	39.4	03	195.1	55.9	63	252.8	72.5
24	23.1	06.6	84	80.7	23.1	44	138.4	39.7	04	196.1	56.2	64	253.7	72.8
25	24.0	06.9	85	81.7	23.4	45	139.4	40.0	05	197.0	56.5	65	254.7	73.0
26	25.0	07.2	86	82.7	23.7	46	140.3	40.2	06	198.0	56.8	66	255.7	73.3
27	26.0	07.4	87	83.6	24.0	47	141.3	40.5	07	199.0	57.0	67	256.6	73.6
28	26.9	07.7	88	84.6	24.2	48	142.2	40.8	08	199.9	57.3	68	257.6	73.9
29	27.9	08.0	89	85.5	24.5	49	143.2	41.1	09	200.9	57.6	69	258.5	74.1
30	28.8	08.3	90	86.5	24.8	50	144.2	41.3	10	201.8	57.9	70	259.5	74.4
31	29.8	08.5	91	87.5	25.1	151	145.1	41.6	211	202.8	58.2	271	260.5	74.7
32	30.8	08.8	92	88.4	25.4	52	146.1	41.9	12	203.8	58.4	72	261.4	75.0
33	31.7	09.1	93	89.4	25.6	53	147.1	42.2	13	204.7	58.7	73	262.4	75.2
34	32.7	09.4	94	90.3	25.9	54	148.0	42.4	14	205.7	59.0	74	263.3	75.5
35	33.6	09.6	95	91.3	26.2	55	149.0	42.7	15	206.6	59.3	75	264.3	75.8
36	34.6	09.9	96	92.3	26.5	56	149.9	43.0	16	207.6	59.5	76	265.3	76.1
37	35.6	10.2	97	93.2	26.7	57	150.9	43.3	17	208.6	59.8	77	266.2	76.3
38	36.5	10.5	98	94.2	27.0	58	151.9	43.5	18	209.5	60.1	78	267.2	76.6
39	37.5	10.7	99	95.2	27.3	59	152.8	43.8	19	210.5	60.4	79	268.2	76.9
40	38.4	11.0	100	96.1	27.6	60	153.8	44.1	20	211.4	60.6	80	269.1	77.2
41	39.4	11.3	101	97.1	27.8	161	154.7	44.4	221	212.4	60.9	281	270.1	77.4
42	40.4	11.6	02	98.0	28.1	62	155.7	44.6	22	213.4	61.2	82	271.0	77.7
43	41.3	11.9	03	99.0	28.4	63	156.7	44.9	23	214.3	61.5	83	272.0	78.0
44	42.3	12.1	04	100.0	28.7	64	157.6	45.2	24	215.3	61.7	84	273.0	78.3
45	43.3	12.4	05	100.9	28.9	65	158.6	45.5	25	216.3	62.0	85	273.9	78.5
46	44.2	12.7	06	101.9	29.2	66	159.5	45.7	26	217.2	62.3	86	274.9	78.8
47	45.2	13.0	07	102.8	29.5	67	160.5	46.0	27	218.2	62.6	87	275.8	79.1
48	46.1	13.2	08	103.8	29.8	68	161.5	46.3	28	219.1	62.8	88	276.8	79.4
49	47.1	13.5	09	104.8	30.0	69	162.4	46.6	29	220.1	63.1	89	277.8	79.6
50	48.1	13.8	10	105.7	30.3	70	163.4	46.9	30	221.1	63.4	90	278.7	79.9
51	49.0	14.1	111	106.7	30.6	171	164.4	47.1	231	222.0	63.7	291	279.7	80.2
52	50.0	14.3	12	107.6	30.9	72	165.3	47.4	32	223.0	63.9	92	280.6	80.5
53	50.9	14.6	13	108.6	31.1	73	166.3	47.7	33	223.9	64.2	93	281.6	80.8
54	51.9	14.9	14	109.6	31.4	74	167.2	48.0	34	224.9	64.5	94	282.6	81.0
55	52.9	15.2	15	110.5	31.7	75	168.2	48.2	35	225.9	64.8	95	283.5	81.3
56	53.8	15.4	16	111.5	32.0	76	169.2	48.5	36	226.8	65.0	96	284.5	81.6
57	54.8	15.7	17	112.5	32.2	77	170.1	48.8	37	227.8	65.3	97	285.5	81.9
58	55.7	16.0	18	113.4	32.5	78	171.1	49.1	38	228.7	65.6	98	286.4	82.1
59	56.7	16.3	19	114.4	32.8	79	172.0	49.3	39	229.7	65.9	99	287.4	82.4
60	57.7	16.5	20	115.3	33.1	80	173.0	49.6	40	230.7	66.1	300	288.3	82.7
Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.

for 74 Degrees.

Difference of Latitude and Departure for 17 Degrees.

Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep
1	01.0	00.3	61	58.3	17.8	121	115.7	35.4	181	173.1	52.9	241	230.5	70.4
2	01.9	00.6	62	59.3	18.1	22	116.7	35.7	82	174.0	53.2	42	231.4	70.7
3	02.9	00.9	63	60.2	18.4	23	117.6	36.0	83	175.0	53.5	43	232.4	71.0
4	03.8	01.2	64	61.2	18.7	24	118.6	36.2	84	175.9	53.8	44	233.3	71.3
5	04.8	01.5	65	62.2	19.0	25	119.5	36.5	85	176.9	54.1	45	234.3	71.6
6	05.7	01.8	66	63.1	19.3	26	120.5	36.8	86	177.9	54.4	46	235.2	71.9
7	06.7	02.0	67	64.1	19.6	27	121.4	37.1	87	178.8	54.7	47	236.2	72.1
8	07.6	02.3	68	65.0	19.9	28	122.4	37.4	88	179.8	55.0	48	237.1	72.4
9	08.6	02.6	69	66.0	20.2	29	123.4	37.7	89	180.7	55.2	49	238.1	72.7
10	09.6	02.9	70	66.9	20.5	30	124.3	38.0	90	181.7	55.5	50	239.1	73.0
11	10.5	03.2	71	67.9	20.8	131	125.3	38.3	191	182.6	55.8	251	240.0	73.3
12	11.5	03.5	72	68.8	21.0	32	126.2	38.6	92	183.6	56.1	52	241.0	73.6
13	12.4	03.8	73	69.8	21.3	33	127.2	38.9	93	184.6	56.4	53	241.9	73.9
14	13.4	04.1	74	70.8	21.6	34	128.1	39.2	94	185.5	56.7	54	242.9	74.1
15	14.3	04.4	75	71.7	21.9	35	129.1	39.5	95	186.5	57.0	55	243.8	74.4
16	15.3	04.7	76	72.7	22.2	36	130.0	39.8	96	187.4	57.3	56	244.8	74.7
17	16.3	05.0	77	73.6	22.5	37	131 0	40.0	97	188.4	57.6	57	245.8	75.0
18	17.2	05.3	78	74.6	22.8	38	132.0	40.3	98	189.3	57.9	58	246.7	75.3
19	18.2	05.6	79	75.5	23.1	39	132.9	40.6	99	190.3	58.2	59	247.7	75.6
20	19.1	05.8	80	76.5	23.4	40	133.9	40.9	200	191.2	58.5	60	248.6	75.9
21	20.1	06.1	81	77.5	23.7	141	134.8	41.2	201	192.2	58.8	261	249.6	76.2
22	21.0	06.4	82	78.4	24.0	42	135.8	41.5	02	193.2	59.0	62	250.5	76.5
23	22.0	06.7	83	79.4	24.3	43	136.7	41.8	03	194.1	59.3	63	251.5	76.8
24	22.9	07.0	84	80.3	24.6	44	137.7	42.1	04	195.1	59.6	64	252.4	77.1
25	23.9	07.3	85	81.3	24.8	45	138.7	42.4	05	196.0	59.9	65	253.4	77.4
26	24.9	07.6	86	82.2	25.1	46	139.6	42.7	06	197.0	60.2	66	254.4	77.7
27	25.8	07.9	87	83.2	25.4	47	140.6	43.0	07	197.9	60.5	67	255.3	77.9
28	26.8	08.2	88	84.1	25.7	48	141.5	43.3	08	198.9	60.8	68	256.3	78.2
29	27.7	08.5	89	85.1	26.0	49	142.5	43.6	09	199.8	61.1	69	257.2	78.5
30	28.7	08.8	90	86.1	26.3	50	143.4	43.8	10	200.8	61.4	70	258.2	78.8
31	29.6	09.1	91	87.0	26.6	151	144.4	44.1	211	201.8	61.7	271	259.1	79.1
32	30.6	09.4	92	88.0	26.9	52	145.3	44.4	12	202.7	62.0	72	260.1	79.4
33	31.6	09.6	93	88.9	27.2	53	146.3	44.7	13	203.7	62.3	73	261.1	79.7
34	32.5	09.9	94	89.9	27.5	54	147.3	45.0	14	204.6	62.6	74	262.0	80.0
35	33.5	10.2	95	90.8	27.8	55	148.2	45.3	15	205.6	62.8	75	263.0	80.3
36	34.4	10.5	96	91.8	28.1	56	149.2	45.6	16	206.5	63.1	76	263.9	80.6
37	35.4	10.8	97	92.8	28.4	57	150.1	45.9	17	207.5	63.4	77	264.9	80.9
38	36.3	11.1	98	93.7	28.6	58	151.1	46.2	18	208.5	63.7	78	265.8	81.2
39	37.3	11.4	99	94.7	28.9	59	152.0	46.5	19	209.5	64.0	79	266.8	81.5
40	38.2	11.7	100	95.6	29.2	60	153.0	46.8	20	210.4	64.3	80	267.7	81.7
41	39.2	12.0	101	96.6	29.5	161	154.0	47.1	221	211.3	64.0	281	268.7	82.0
42	40.2	12.3	02	97.5	29.8	62	154.9	47.4	22	212.3	64.9	82	269.7	82.3
43	41.1	12.6	03	98.5	30.1	63	155.9	47.6	23	213.2	65.2	83	270.6	82.6
44	42.1	12.9	04	99.4	30.4	64	156.8	47.9	24	214.2	65.5	84	271.6	82.9
45	43.0	13.2	05	100.4	30.7	65	157.8	48.2	25	215.2	65.8	85	272.5	83.2
46	44.0	13.4	06	101.4	31.0	66	158.7	48.5	26	216.1	66.1	86	273.5	83.5
47	44.9	13.7	07	102.3	31.3	67	159.7	48.8	27	217.1	66.4	87	274.4	83.8
48	45.9	14.0	08	103.3	31.6	68	160.6	49.1	28	218.0	66.6	88	275.4	84.1
49	46.9	14.3	09	104.2	31.9	69	161.6	49.4	29	219.0	66.9	89	276.4	84.4
50	47.8	14.6	10	105.2	32.2	70	162.6	49.7	30	219.9	67.2	90	277.3	84.7
51	48.8	14.9	111	106.1	32.4	171	163.5	50.0	231	220.9	67.5	291	278.3	85.0
52	49.7	15.2	12	107.1	32.7	72	164.5	50.3	32	221.8	67.8	92	279.2	85.3
53	50.7	15.5	13	108.1	33.0	73	165.4	50.6	33	222.8	68.1	93	280.2	85.5
54	51.6	15.8	14	109.0	33.3	74	166.4	50.9	34	223.8	68.4	94	281.1	85.8
55	52.6	16.1	15	110.0	33.6	75	167.3	51.2	35	224.7	68.7	95	282.1	86.1
56	53.5	16.4	16	110.9	33.9	76	168 3	51.4	36	225.7	69.0	96	283.0	86.4
57	54.5	16.7	17	111.9	34.2	77	169.3	51.7	37	226.6	69.3	97	284.0	86.7
58	55.5	17.0	18	112.8	34.5	78	170.2	52.0	38	227 6	69.6	98	285.0	87.0
59	56.4	17.2	19	113.8	34.8	79	171.2	52.3	39	228.5	69.9	99	285.9	87.3
60	57.4	17.5	20	114.7	35.1	80	172.1	52.6	40	229.5	70.2	300	286.9	87.6
Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.

E e for 73 Degrees.

Difference of Latitude and Departure for 18 Degrees.

Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep
1	01.0	00.3	61	58.0	18.8	121	115.1	37.4	181	172.1	55.9	241	229.2	74.5
2	01.9	00.6	62	59.0	19.2	22	116.0	37.7	82	173.1	56.2	42	230.1	74.8
3	02.9	00.9	63	59.9	19.5	23	117.0	38.0	83	174.0	56.5	43	231.1	75.1
4	03.8	01.2	64	60.9	19.8	24	117.9	38.3	84	175.0	56.9	44	232.0	75.4
5	04.8	01.5	65	61.8	20.1	25	118.9	38.6	85	175.9	57.2	45	233.0	75.7
6	05.7	01.9	66	62.8	20.4	26	119.8	38.9	86	176.9	57.5	46	233.9	76.0
7	06.7	02.2	67	63.7	20.7	27	120.8	39.2	87	177.8	57.8	47	234.9	76.3
8	07.6	02.5	68	64.7	21.0	28	121.7	39.6	88	178.8	58.1	48	235.8	76.6
9	08.6	02.8	69	65.6	21.3	29	122.7	39.9	89	179.7	58.4	49	236.8	76.9
10	09.5	03.1	70	66.6	21.6	30	123.6	40.2	90	180.7	58.7	50	237.8	77.3
11	10.5	03.4	71	67.5	21.9	131	124.6	40.5	191	181.6	59.0	251	238.7	77.6
12	11.4	03.7	72	68.5	22.2	32	125.5	40.8	92	182.6	59.3	52	239.7	77.9
13	12.4	04.0	73	69.4	22.6	33	126.5	41.1	93	183.5	59.6	53	240.6	78.2
14	13.3	04.3	74	70.4	22.9	34	127.4	41.4	94	184.5	59.9	54	241.6	78.5
15	14.3	04.6	75	71.3	23.2	35	128.4	41.7	95	185.4	60.3	55	242.5	78.8
16	15.2	04.9	76	72.3	23.5	36	129.3	42.0	96	186.4	60.6	56	243.5	79.1
17	16.2	05.3	77	73.2	23.8	37	130.3	42.3	97	187.3	60.9	57	244.4	79.4
18	17.1	05.6	78	74.2	24.1	38	131.2	42.6	98	188.3	61.2	58	245.4	79.7
19	18.1	05.9	79	75.1	24.4	39	132.2	43.0	99	189.2	61.5	59	246.3	80.0
20	19.0	06.2	80	76.1	24.7	40	133.1	43.3	200	190.2	61.8	60	247.3	80.3
21	20.0	06.5	81	77.0	25.0	141	134.1	43.6	201	191.2	62.1	261	248.2	80.6
22	20.9	06.8	82	78.0	25.3	42	135.0	43.9	02	192.1	62.4	62	249.2	81.0
23	21.9	07.1	83	78.9	25.6	43	136.0	44.2	03	193.1	62.7	63	250.1	81.3
24	22.8	07.4	84	79.9	26.0	44	136.9	44.5	04	194.0	63.0	64	251.1	81.6
25	23.8	07.7	85	80.8	26.3	45	137.9	44.8	05	195.0	63.3	65	252.0	81.9
26	24.7	08.0	86	81.8	26.6	46	138.8	45.1	06	195.9	63.7	66	253.0	82.2
27	25.7	08.3	87	82.7	26.9	47	139.8	45.4	07	196.9	64.0	67	253.9	82.5
28	26.6	08.7	88	83.7	27.2	48	140.7	45.7	08	197.8	64.3	68	254.9	82.8
29	27.6	09.0	89	84.6	27.5	49	141.7	46.0	09	198.8	64.6	69	255.8	83.1
30	28.5	09.3	90	85.6	27.8	50	142.7	46.9	10	199.7	64.9	70	256.8	83.4
31	29.5	09.6	91	86.5	28.1	151	143.6	46.7	211	200.7	65.2	271	257.7	83.7
32	30.4	09.9	92	87.5	28.4	52	144.6	47.0	12	201.6	65.5	72	258.7	84.0
33	31.4	10.2	93	88.4	28.7	53	145.5	47.3	13	202.6	65.8	73	259.6	84.4
34	32.3	10.5	94	89.4	29.0	54	146.5	47.6	14	203.5	66.1	74	260.6	84.7
35	33.3	10.8	95	90.3	29.4	55	147.4	47.9	15	204.5	66.4	75	261.5	85.0
36	34.2	11.1	96	91.3	29.7	56	148.4	48.2	16	205.4	66.7	76	262.5	85.3
37	35.2	11.4	97	92.2	30.0	57	149.3	48.5	17	206.4	67.1	77	263.4	85.6
38	36.1	11.7	98	93.2	30.3	58	150.3	48.8	18	207.3	67.4	78	264.4	85.9
39	37.1	12.1	99	94.1	30.6	59	151.2	49.1	19	208.3	67.7	79	265.3	86.2
40	38.0	12.4	100	95.1	30.9	60	152.2	49.4	20	209.2	68.0	80	266.3	86.5
41	39.0	12.7	101	96.1	31.2	161	153.1	49.7	221	210.2	68.3	281	267.2	86.8
42	39.9	13.0	02	97.0	31.5	62	154.1	50.1	22	211.1	68.6	82	268.2	87.1
43	40.9	13.3	03	98.0	31.8	63	155.0	50.4	23	212.1	68.9	83	269.1	87.4
44	41.8	13.6	04	98.9	32.1	64	156.0	50.7	24	213.0	69.2	84	270.1	87.8
45	42.8	13.9	05	99.9	32.4	65	156.9	51.0	25	214.0	69.5	85	271.0	88.1
46	43.7	14.2	06	100.8	32.8	66	157.9	51.3	26	214.9	69.8	86	272.0	88.4
47	44.7	14.5	07	101.8	33.1	67	158.8	51.6	27	215.9	70.1	87	272.9	88.7
48	45.6	14.8	08	102.7	33.4	68	159.8	51.9	28	216.8	70.5	88	273.8	89.0
49	46.6	15.1	09	103.7	33.7	69	160.7	52.2	29	217.8	70.8	89	274.8	89.3
50	47.6	15.5	10	104.6	34.0	70	161.7	52.5	30	218.7	71.1	90	275.8	89.6
51	48.5	15.8	111	105.6	34.3	171	162.6	52.8	231	219.7	71.4	291	276.7	89.9
52	49.5	16.1	12	106.5	34.6	72	163.6	53.1	32	220.6	71.7	92	277.7	90.2
53	50.4	16.4	13	107.5	34.9	73	164.5	53.5	33	221.6	72.0	93	278.6	90.5
54	51.4	16.7	14	108.4	35.2	74	165.5	53.8	34	222.5	72.3	94	279.6	90.8
55	52.3	17.0	15	109.4	35.5	75	166.4	54.1	35	223.5	72.6	95	280.5	91.2
56	53.3	17.3	16	110.3	35.8	76	167.4	54.4	36	224.4	72.9	96	281.5	91.5
57	54.2	17.6	17	111.3	36.2	77	168.3	54.7	37	225.4	73.2	97	282.4	91.8
58	55.2	17.9	18	112.2	36.5	78	169.3	55.0	38	226.3	73.5	98	283.4	92.1
59	56.1	18.2	19	113.2	36.8	79	170.2	55.3	39	227.3	73.9	99	284.3	92.4
60	57.1	18.5	20	114.1	37.1	80	171.2	55.6	40	228.2	74.2	300	285.3	92.7
Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat	Diſt	Dep.	Lat.	Diſt	Dep.	Lat

for 72 Degrees.

Difference of Latitude and Departure for 19 Degrees.

Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.
1	00.9	00.3	61	57.7	19.9	121	114.4	39.4	181	171.1	58.9	241	227.9	78.5
2	01.9	00.7	62	58.6	20.2	22	115.3	39.7	82	172.1	59.3	42	228.8	78.8
3	02.8	01.0	63	59.6	20.5	23	116.3	40.0	83	173.0	59.6	43	229.7	79.1
4	03.8	01.3	64	60.5	20.8	24	117.2	40.4	84	174.0	59.9	44	230.7	79.4
5	04.7	01.6	65	61.5	21.2	25	118.2	40.7	85	174.9	60.2	45	231.6	79.8
6	05.7	02.0	66	62.4	21.5	26	119.1	41.0	86	175.9	60.6	46	232.6	80.1
7	06.6	02.3	67	63.3	21.8	27	120.1	41.4	87	176.8	60.9	47	233.5	80.4
8	07.6	02.6	68	64.3	22.1	28	121.0	41.7	88	177.7	61.2	48	234.5	80.7
9	08.5	02.9	69	65.2	22.5	29	122.0	42.0	89	178.7	61.5	49	235.4	81.1
10	09.5	03.3	70	66.2	22.8	30	122.9	42.3	90	179.6	61.9	50	236.4	81.4
11	10.4	03.6	71	67.1	23.1	131	123.9	42.7	191	180.6	62.2	251	237.3	81.7
12	11.3	03.9	72	68.1	23.4	32	124.8	43.0	92	181.5	62.5	52	238.3	82.1
13	12.3	04.2	73	69.0	23.8	33	125.7	43.3	93	182.5	62.8	53	239.2	82.4
14	13.2	04.6	74	70.0	24.1	34	126.7	43.6	94	183.4	63.2	54	240.1	82.7
15	14.2	04.9	75	70.9	24.4	35	127.6	44.0	95	184.4	63.5	55	241.1	83.0
16	15.1	05.2	76	71.9	24.7	36	128.6	44.3	96	185.3	63.8	56	242.0	83.4
17	16.1	05.5	77	72.8	25.1	37	129.5	44.6	97	186.3	64.1	57	243.0	83.7
18	17.0	05.9	78	73.7	25.4	38	130.5	44.9	98	187.2	64.5	58	243.9	84.0
19	18.0	06.2	79	74.7	25.7	39	131.4	45.3	99	188.1	64.8	59	244.9	84.3
20	18.9	06.5	80	75.6	26.0	40	132.4	45.6	200	189.1	65.1	60	245.8	84.7
21	19.9	06.8	81	76.6	26.4	141	133.3	45.9	201	190.0	65.4	261	246.8	85.0
22	20.8	07.2	82	77.5	26.7	42	134.3	46.2	02	191.0	65.8	62	247.7	85.3
23	21.7	07.5	83	78.5	27.0	43	135.2	46.6	03	191.9	66.1	63	248.7	85.6
24	22.7	07.8	84	79.4	27.4	44	136.1	46.9	04	192.9	66.4	64	249.6	86.0
25	23.6	08.1	85	80.4	27.7	45	137.1	47.2	05	193.8	66.7	65	250.5	86.3
26	24.6	08.5	86	81.3	28.0	46	138.0	47.5	06	194.8	67.1	66	251.5	86.6
27	25.5	08.8	87	82.3	28.3	47	139.0	47.9	07	195.7	67.4	67	252.4	86.9
28	26.5	09.1	88	83.2	28.7	48	139.9	48.2	08	196.7	67.7	68	253.4	87.3
29	27.4	09.4	89	84.1	29.0	49	140.9	48.5	09	197.6	68.1	69	254.3	87.6
30	28.4	09.8	90	85.1	29.3	50	141.8	48.8	10	198.5	68.4	70	255.3	87.9
31	29.3	10.1	91	86.0	29.6	151	142.8	49.2	211	199.5	68.7	271	256.2	88.2
32	30.3	10.4	92	87.0	30.0	52	143.7	49.5	12	200.4	69.0	72	257.2	88.6
33	31.1	10.7	93	87.9	30.3	53	144.7	49.8	13	201.4	69.4	73	258.1	88.9
34	32.1	11.1	94	88.9	30.6	54	145.6	50.1	14	202.3	69.7	74	259.1	89.2
35	33.1	11.4	95	89.8	30.9	55	146.5	50.5	15	203.3	70.0	75	260.0	89.5
36	34.0	11.7	96	90.8	31.3	56	147.5	50.8	16	204.2	70.3	76	260.9	89.9
37	35.0	12.0	97	91.7	31.6	57	148.4	51.1	17	205.2	70.7	77	261.9	90.2
38	35.9	12.4	98	92.7	31.9	58	149.4	51.4	18	206.1	71.0	78	262.8	90.5
39	36.9	12.7	99	93.6	32.2	59	150.3	51.8	19	207.1	71.3	79	263.8	90.8
40	37.8	13.0	100	94.5	32.6	60	151.3	52.1	20	208.0	71.6	80	264.7	91.2
41	38.8	13.3	101	95.5	32.9	161	152.2	52.4	221	208.9	72.0	281	265.7	91.5
42	39.7	13.7	02	96.4	33.2	62	153.2	52.7	22	209.9	72.3	82	266.6	91.8
43	40.7	14.0	03	97.4	33.5	63	154.1	53.1	23	210.8	72.6	83	267.6	92.1
44	41.6	14.3	04	98.3	33.9	64	155.1	53.4	24	211.8	72.9	84	268.5	92.5
45	42.5	14.7	05	99.3	34.2	65	156.0	53.7	25	212.7	73.3	85	269.5	92.8
46	43.5	15.0	06	100.2	34.5	66	156.9	54.0	26	213.7	73.6	86	270.4	93.1
47	44.4	15.3	07	101.2	34.8	67	157.9	54.4	27	214.6	73.9	87	271.3	93.4
48	45.4	15.6	08	102.1	35.2	68	158.8	54.7	28	215.6	74.2	88	272.3	93.8
49	46.3	16.0	09	103.1	35.5	69	159.8	55.0	29	216.5	74.6	89	273.2	94.1
50	47.3	16.3	10	104.0	35.8	70	160.7	55.4	30	217.5	74.9	90	274.2	94.4
51	48.2	16.6	111	104.9	36.1	171	161.7	55.7	231	218.4	75.2	291	275.1	94.7
52	49.2	16.9	12	105.9	36.5	72	162.6	56.0	32	219.3	75.5	92	276.1	95.1
53	50.1	17.3	13	106.8	36.8	73	163.6	56.3	33	220.3	75.9	93	277.0	95.4
54	51.1	17.6	14	107.8	37.1	74	164.5	56.7	34	221.2	76.2	94	278.0	95.7
55	52.0	17.9	15	108.7	37.4	75	165.5	57.0	35	222.2	76.5	95	278.9	96.1
56	52.9	18.2	16	109.7	37.8	76	166.4	57.3	36	223.1	76.8	96	279.9	96.4
57	53.9	18.6	17	110.6	38.1	77	167.3	57.6	37	224.1	77.2	97	280.8	96.7
58	54.8	18.9	18	111.6	38.4	78	168.3	58.0	38	225.0	77.5	98	281.7	97.0
59	55.8	19.2	19	112.5	38.7	79	169.2	58.3	39	226.0	77.8	99	282.7	97.4
60	56.7	19.5	20	113.5	39.1	80	170.2	58.6	40	226.9	78.1	300	283.6	97.7
Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.

for 71 Degrees.

Difference of Latitude and Departure for 20 Degrees.

Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.
[illegible]	00.9	00.3	61	57.3	20.9	121	113.7	41.4	181	170.1	61.9	241	226.5	82.4
2	01.9	00.7	62	58.3	21.2	22	114.6	41.7	82	171.0	62.2	42	227.4	82.8
3	02.8	01.0	63	59.2	21.5	23	115.6	42.1	83	172.0	62.6	43	228.3	83.1
4	03.8	01.4	64	60.1	21.9	24	116.5	42.4	84	172.9	62.9	44	229.3	83.4
5	04.7	01.7	65	61.1	22.2	25	117.5	42.8	85	173.8	63.3	45	230.2	83.8
6	05.6	02.1	66	62.0	22.6	26	118.4	43.1	86	174.8	63.6	46	231.2	84.1
7	06.6	02.4	67	63.0	22.9	27	119.3	43.4	87	175.7	64.0	47	232.1	84.5
8	07.5	02.7	68	63.9	23.3	28	120.3	43.8	88	176.7	64.3	48	233.0	84.8
9	08.5	03.1	69	64.8	23.6	29	121.2	44.1	89	177.6	64.6	49	234.0	85.2
10	09.4	03.4	70	65.8	23.9	30	122.2	44.5	90	178.5	65.0	50	234.9	85.5
11	10.3	03.8	71	66.7	24.3	131	123.1	44.8	191	179.5	65.3	251	235.9	85.8
12	11.3	04.1	72	67.7	24.6	32	124.0	45.1	92	180.4	65.7	52	236.8	86.2
13	12.2	04.4	73	68.6	25.0	33	125.0	45.5	93	181.4	66.0	53	237.7	86.5
14	13.2	04.8	74	69.5	25.3	34	125.9	45.8	94	182.3	66.3	54	238.7	86.9
15	14.1	05.1	75	70.5	25.7	35	126.9	46.2	95	183.2	66.7	55	239.6	87.2
16	15.0	05.5	76	71.4	26.0	36	127.8	46.5	96	184.2	67.0	56	240.6	87.6
17	16.0	05.8	77	72.4	26.3	37	128.7	46.9	97	185.1	67.4	57	241.5	87.9
18	16.9	06.2	78	73.3	26.7	38	129.7	47.2	98	186.1	67.7	58	242.4	88.2
19	17.9	06.5	79	74.2	27.0	39	130.6	47.5	99	187.0	68.1	59	243.4	83.6
20	18.8	06.8	80	75.2	27.4	40	131.6	47.9	200	187.9	68.4	60	244.3	88.9
21	19.7	07.2	81	76.1	27.7	141	132.5	48.2	201	188.9	68.7	261	245.3	89.3
22	20.7	07.5	82	77.1	28.0	42	133.4	48.6	02	189.8	69.1	62	246.2	89.6
23	21.6	07.9	83	78.0	28.4	43	134.4	48.9	03	190.8	69.4	63	247.1	89.9
24	22.6	08.2	84	78.9	28.7	44	135.3	49.2	04	191.7	69.8	64	248.1	90.3
25	23.5	08.6	85	79.9	29.1	45	136.3	49.6	05	192.6	70.1	65	249.0	90.6
26	24.4	08.9	86	80.8	29.4	46	137.2	49.9	06	193.6	70.5	66	250.0	91.0
27	25.4	09.2	87	81.8	29.8	47	138.1	50.3	07	194.5	70.8	67	250.9	91.3
28	26.3	09.6	88	82.7	30.1	48	139.1	50.6	08	195.5	71.1	68	251.8	91.7
29	27.3	09.9	89	83.6	30.4	49	140.0	51.0	09	196.4	71.5	69	252.8	92.0
30	28.2	10.3	90	84.6	30.8	50	141.0	51.3	10	197.3	71.8	70	253.7	92.3
31	29.1	10.6	91	85.5	31.1	151	141.9	51.6	211	198.3	72.2	271	254.7	92.7
32	30.1	10.9	92	86.5	31.5	52	142.8	52.0	12	199.2	72.5	72	255.6	93.0
33	31.0	11.3	93	87.4	31.8	53	143.8	52.3	13	200.2	72.8	73	256.5	93.4
34	31.9	11.6	94	88.3	32.1	54	144.7	52.7	14	201.1	73.2	74	257.5	93.7
35	32.9	12.0	95	89.3	32.5	55	145.7	53.0	15	202.0	73.5	75	258.4	94.1
36	33.8	12.3	96	90.2	32.8	56	146.6	53.4	16	203.0	73.9	76	259.4	94.4
37	34.8	12.7	97	91.2	33.2	57	147.5	53.7	17	203.9	74.2	77	260.3	94.7
38	35.7	13.0	98	92.1	33.5	58	148.5	54.0	18	204.9	74.6	78	261.2	95.1
39	36.6	13.3	99	93.0	33.9	59	149.4	54.4	19	205.8	74.9	79	262.2	95.4
40	37.6	13.7	100	94.0	34.2	60	150.4	54.7	20	206.7	75.2	80	263.1	95.8
41	38.5	14.0	101	94.9	34.5	161	151.3	55.1	221	207.7	75.6	281	264.1	96.1
42	39.5	14.4	02	95.8	34.9	62	152.2	55.4	22	208.6	75.9	82	265.0	96.4
43	40.4	14.7	03	96.8	35.2	63	153.2	55.7	23	209.6	76.3	83	265.9	96.8
44	41.3	15.0	04	97.7	35.6	64	154.1	56.1	24	210.5	76.6	84	266.9	97.1
45	42.3	15.4	05	98.7	35.9	65	155.1	56.4	25	211.4	77.0	85	267.8	97.5
46	43.2	15.7	06	99.6	36.3	66	156.0	56.8	26	212.4	77.3	86	268.8	97.8
47	44.2	16.1	07	100.5	36.6	67	156.9	57.1	27	213.3	77.6	87	269.7	98.2
48	45.1	16.4	08	101.5	36.9	68	157.9	57.5	28	214.3	78.0	88	270.6	98.5
49	46.0	16.8	09	102.4	37.3	69	158.8	57.8	29	215.2	78.3	89	271.6	98.8
50	47.0	17.1	10	103.4	37.6	70	159.7	58.1	30	216.1	78.7	90	272.5	99.2
51	47.9	17.4	111	104.3	38.0	171	160.7	58.5	231	217.1	79.0	291	273.5	99.5
52	48.9	17.8	12	105.2	38.3	72	161.6	58.8	32	218.0	79.3	92	274.4	99.9
53	49.8	18.1	13	106.2	38.6	73	162.6	59.2	33	219.0	79.7	93	275.3	100.2
54	50.7	18.5	14	107.1	39.0	74	163.5	59.5	34	219.9	80.0	94	276.3	100.5
55	51.7	18.8	15	108.1	39.3	75	164.4	59.9	35	220.8	80.4	95	277.2	100.9
56	52.6	19.2	16	109.0	39.7	76	165.4	60.2	36	221.8	80.7	96	278.2	101.1
57	53.6	19.5	17	109.9	40.0	77	166.3	60.5	37	222.7	81.1	97	279.1	101.6
58	54.5	19.8	18	110.9	40.4	78	167.3	60.9	38	223.6	81.4	98	280.0	101.9
59	55.4	20.2	19	111.8	40.7	79	168.2	61.2	39	224.6	81.7	99	281.0	102.3
60	56.4	20.5	20	112.8	41.0	80	169.1	61.6	40	225.5	82.1	300	281.9	102.6
Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.

for 70 Degrees.

Difference of Latitude and Departure for 21 Degrees.

Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep
1	00.9	00.4	61	56.9	21.9	121	113.0	43.4	181	169.0	64.9	241	225.0	86.4
2	01.9	00.7	62	57.9	22.2	22	113.9	43.7	82	169.9	65.2	42	225.9	86.7
3	02.8	01.1	63	58.8	22.6	23	114.9	44.1	83	170.9	65.2	43	226.6	87.1
4	03.7	01.4	64	59.7	22.9	24	115.8	44.4	84	171.8	65.9	44	227.8	87.4
5	04.7	01.8	65	60.7	23.3	25	116.7	44.8	85	172.7	66.3	45	228.7	87.8
6	05.6	02.2	66	61.6	23.7	26	117.7	45.2	86	173.7	66.7	46	229.7	88.2
7	06.5	02.5	67	62.5	24.0	27	118.6	45.5	87	174.6	67.0	47	230.6	88.5
8	07.5	02.9	68	63.5	24.4	28	119.5	45.9	88	175.5	67.4	48	231.5	88.9
9	08.4	03.2	69	64.4	24.7	29	120.5	46.2	89	176.5	67.7	49	232.5	89.2
10	09.3	03.6	70	65.3	25.1	30	121.4	46.6	90	177.4	68.1	50	233.4	89.6
11	10.3	03.9	71	66.3	25.4	131	122.3	47.0	191	178.3	68.5	251	234.3	90.0
12	11.2	04.3	72	67.2	25.8	32	123.3	47.9	92	179.3	68.8	52	235.3	90.3
13	12.1	04.6	73	68.1	26.2	33	124.2	47.7	93	180.2	69.2	53	236.2	90.7
14	13.1	95.0	74	69.1	26.5	34	125.1	48.0	94	181.1	69.5	54	237.1	91.0
15	14.0	05.4	75	70.0	26.9	35	126.1	48.4	95	182.1	69.9	55	238.1	91.4
16	14.9	05.7	76	70.9	26.2	36	127.0	48.7	96	183.0	70.2	56	239.0	91.8
17	15.9	06.1	77	71.9	27.6	37	127.9	49.1	97	183.9	70.6	57	239.9	92.1
18	16.8	06.5	78	72.8	28.0	38	128.9	49.5	98	184.9	71.0	58	240.9	92.5
19	17.7	06.8	79	73.7	28.3	39	129.8	49.8	99	185.8	71.3	59	241.8	92.8
20	18.7	07.2	80	74.7	28.7	40	130.7	50.2	200	186.7	71.7	60	242.7	93.2
21	19.6	07.5	81	75.6	29.0	141	131.7	50.5	201	187.6	72.0	261	243.7	93.5
22	20.5	07.9	82	76.5	29.4	42	132.6	50.9	02	188.6	72.4	62	244.6	93.9
23	21.5	08.2	83	77.5	29.7	43	133.5	51.3	03	189.5	72.8	63	245.5	94.3
24	22.4	08.6	84	78.4	30.1	44	134.5	51.6	04	190.4	73.1	64	246.5	94.6
25	23.3	09.0	85	79.3	30.5	45	135.4	52.0	05	191.4	73.5	65	247.4	95.0
26	24.3	09.3	86	80.3	30.8	46	136.3	52.3	06	192.3	73.8	66	248.3	95.3
27	25.2	09.7	87	81.2	31.2	47	137.3	52.7	07	193.2	74.2	67	249.3	95.7
28	26.1	10.0	88	82.1	31.5	48	138.2	53.0	08	194.2	74.5	68	250.2	96.1
29	27.1	10.4	89	83.1	31.9	49	139.1	53.4	09	195.1	74.9	69	251.1	96.4
30	28.0	10.8	90	84.0	32.3	50	140.1	53.8	10	196.0	75.3	70	252.1	96.8
31	28.9	11.1	91	84.9	32.6	151	141.0	54.1	211	197.0	75.6	271	253.0	97.1
32	29.9	11.5	92	85.9	33.0	52	141.9	54.5	12	197.9	76.0	72	253.9	97.5
33	30.8	11.8	93	86.8	33.3	53	142.9	54.8	13	198.8	76.3	73	254.9	97.8
34	31.7	12.2	94	87.7	33.7	54	143.8	55.2	14	199.8	76.7	74	255.8	98.2
35	32.7	12.5	95	88.7	34.0	55	144.7	55.6	15	200.7	77.1	75	256.7	98.6
36	33.6	12.9	96	89.6	34.4	56	145.7	55.9	16	201.6	77.3	76	257.7	98.9
37	34.5	13.3	97	90.5	34.8	57	146.6	56.3	17	202.6	77.8	77	258.6	99.3
38	35.5	13.6	98	91.5	35.1	58	147.5	56.6	18	203.5	78.1	78	259.5	99.6
39	36.4	14.0	99	92.4	35.5	59	148.5	57.0	19	204.4	78.5	79	260.5	100.0
40	37.3	14.3	100	93.4	35.8	60	149.4	57.3	20	205.4	78.8	80	261.4	100.4
41	38.3	14.7	101	94.3	36.2	161	150.3	57.7	221	206.3	79.2	281	262.3	100.7
42	39.2	15.1	02	95.3	36.6	62	151.3	58.1	22	207.2	79.6	82	263.3	101.1
43	40.1	15.4	03	96.2	36.9	63	152.2	58.4	23	208.2	79.9	83	264.2	101.4
44	41.1	15.8	04	97.1	37.3	64	153.1	58.8	24	209.1	80.3	84	265.1	101.8
45	42.0	16.1	05	98.1	37.6	65	154.1	59.1	25	210.0	80.6	85	266.1	102.1
46	42.9	16.5	06	99.0	38.0	66	155.0	59.5	26	211.0	81.0	86	267.0	102.5
47	43.9	16.8	07	99.9	38.3	67	155.9	59.9	27	211.9	81.4	87	267.9	102.9
48	44.8	17.2	08	100.9	38.7	68	156.9	60.2	28	212.8	81.7	88	268.9	103.2
49	45.7	17.6	09	101.8	39.1	69	157.8	60.6	29	213.8	82.1	89	269.8	103.6
50	46.7	17.9	10	102.7	39.4	70	158.7	60.9	30	214.7	82.4	90	270.7	103.9
51	47.6	18.3	111	103.7	39.8	171	159.7	61.3	231	215.6	82.8	291	271.7	104.3
52	48.5	18.6	12	104.6	40.1	72	160.6	61.6	32	216.6	83.1	92	272.6	104.7
53	49.5	19.0	13	105.5	40.5	73	161.5	62.0	33	217.5	83.5	93	273.5	105.0
54	50.4	19.4	14	106.5	40.9	74	162.5	62.4	34	218.4	83.9	94	274.5	105.4
55	51.3	19.7	15	107.4	41.2	75	163.4	62.7	35	219.4	84.2	95	275.4	105.7
56	52.3	20.1	16	108.3	41.6	76	164.3	63.1	36	220.3	84.6	96	276.3	106.1
57	53.2	20.4	17	109.3	41.9	77	165.3	63.4	37	221.2	84.9	97	277.3	106.4
58	54.1	20.8	18	110.2	42.3	78	166.2	63.8	38	222.2	85.3	98	278.2	106.8
59	55.1	21.1	19	111.1	42.6	79	167.1	64.2	39	223.1	85.7	99	279.1	107.2
60	56.0	21.5	20	112.1	43.0	80	168.1	64.5	40	224.1	86.0	300	280.1	107.5
Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.

for 69 Degrees.

Difference of Latitude and Departure for 22 Degrees.

Diſt	Lat	Dep.	Diſt	Lat.	Lat.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.
1	00.9	00.4	61	56.6	22.9	121	112.2	45.3	181	167.8	67.8	241	223.5	90.3
2	01.9	00.7	62	57.5	23.2	22	113.1	45.7	82	168.8	68.2	42	224.4	90.7
3	02.8	01.1	63	58.4	23.6	23	114.0	46.1	83	169.7	68.6	43	225.3	91.0
4	03.7	01.5	64	59.3	24.0	24	115.0	46.5	84	170.6	68.9	44	226.2	91.4
5	04.6	01.9	65	60.3	24.3	25	115.9	46.8	85	171.5	69.3	45	227.2	91.8
6	05.6	02.2	66	61.2	24.7	26	116.8	47.2	86	172.5	69.7	46	228.1	92.2
7	06.5	02.6	67	62.1	25.1	27	117.8	47.6	87	173.4	70.1	47	229.0	92.5
8	07.4	03.0	68	63.0	25.5	28	118.7	47.9	88	174.3	70.4	48	229.9	92.9
9	08.3	03.4	69	64.0	25.8	29	119.6	48.3	89	175.2	70.8	49	230.9	93.3
10	09.3	03.7	70	64.9	26.2	30	120.5	48.7	90	176.2	71.2	50	231.8	93.7
11	10.2	04.1	71	65.8	26.6	131	121.5	49.1	191	177.1	71.5	251	232.7	94.0
12	11.1	04.5	72	66.8	27.0	32	122.4	49.4	92	178.0	71.9	52	233.7	94.4
13	12.1	04.9	73	67.7	27.3	33	123.3	49.8	93	178.9	72.3	53	234.6	94.8
14	13.0	05.2	74	68.6	27.7	34	124.2	50.2	94	179.8	72.7	54	235.5	95.2
15	13.9	05.6	75	69.5	28.1	35	125.2	50.6	95	180.8	73.0	55	236.4	95.5
16	14.8	06.0	76	70.5	28.5	36	126.1	50.9	96	181.7	73.4	56	237.4	95.9
17	15.8	06.4	77	71.4	28.8	37	127.0	51.3	97	181.7	73.8	57	238.3	96.3
18	16.7	06.7	78	72.3	29.2	38	128.0	51.7	98	183.6	74.2	58	239.2	96.6
19	17.6	07.1	79	73.2	29.6	39	128.9	52.1	99	184.5	74.5	59	240.1	97.0
20	18.5	07.5	80	74.2	30.0	40	129.8	52.4	200	185.4	74.9	60	241.1	97.4
21	19.5	07.9	81	75.1	30.3	141	130.7	52.8	201	186.4	75.3	261	242.0	97.8
22	20.4	08.2	82	76.0	30.7	42	131.7	53.2	02	187.3	75.7	62	242.9	98.1
23	21.3	08.6	83	77.0	31.1	43	132.6	53.6	03	188.2	76.0	63	243.9	98.5
24	22.3	09.0	84	77.9	31.5	44	133.5	53.9	04	189.1	76.4	64	244.8	98.9
25	23.2	09.4	85	78.8	31.8	45	134.4	54.3	05	190.1	76.8	65	245.7	99.3
26	24.1	09.7	86	79.7	32.2	46	135.4	54.7	06	191.0	77.2	66	246.6	99.6
27	25.0	10.1	87	80.7	32.6	47	136.3	55.1	07	191.9	77.5	67	247.6	100.0
28	26.0	10.5	88	81.6	33.0	48	137.2	55.4	08	192.9	77.9	68	248.5	100.4
29	26.9	10.9	89	82.5	33.3	49	138.2	55.8	09	193.8	78.3	69	249.4	100.8
30	27.8	11.2	90	83.4	33.7	50	139.1	56.2	10	194.7	78.7	70	250.3	101.1
31	28.7	11.6	91	84.4	34.1	151	140.0	56.6	211	195.6	79.0	271	251.3	101.5
32	29.7	12.0	92	85.3	34.5	52	140.9	56.9	12	196.6	79.4	72	252.2	101.9
33	30.6	12.4	93	86.2	34.8	53	141.9	57.3	13	197.5	79.8	73	253.1	102.3
34	31.5	12.7	94	87.2	35.2	54	142.8	57.7	14	198.4	80.2	74	254.1	102.6
35	32.5	13.1	95	88.1	35.6	55	143.7	58.1	15	199.3	80.5	75	255.0	103.0
36	33.4	13.5	96	89.0	36.0	56	144.6	58.4	16	200.3	80.9	76	255.9	103.4
37	34.3	13.9	97	89.9	36.3	57	145.6	58.8	17	201.2	81.3	77	256.8	103.8
38	35.2	14.2	98	90.9	36.7	58	146.5	59.2	18	202.1	81.7	78	257.8	104.1
39	36.2	14.6	99	91.8	37.1	59	147.4	59.6	19	203.1	82.0	79	258.7	104.5
40	37.1	15.0	100	92.7	37.5	60	148.4	59.9	20	204.0	82.4	80	259.6	104.9
41	38.0	15.4	101	93.6	37.8	161	149.3	60.3	221	204.9	82.8	281	260.5	105.3
42	38.9	15.7	02	94.6	38.2	62	150.2	60.7	22	205.8	83.2	82	261.5	105.6
43	39.9	16.1	03	95.5	38.6	63	151.1	61.1	23	206.7	83.5	83	262.4	106.0
44	40.8	16.5	04	96.4	39.0	64	152.1	61.4	24	207.7	83.9	84	263.3	106.4
45	41.7	16.9	05	97.4	39.3	65	153.0	61.8	25	208.6	84.3	85	264.3	106.8
46	42.7	17.2	06	98.3	39.7	66	153.9	62.2	26	209.5	84.7	86	265.2	107.1
47	43.6	17.6	07	99.2	40.1	67	154.8	62.6	27	210.5	85.0	87	266.1	107.5
48	44.5	18.0	08	100.1	40.5	68	155.8	62.9	28	211.4	85.4	88	267.0	107.9
49	45.4	18.4	09	101.1	40.8	69	156.7	63.3	29	212.3	85.8	89	268.0	108.3
50	46.4	18.7	10	102.0	41.2	70	157.6	63.7	30	213.3	86.2	90	268.9	108.6
51	47.3	19.1	111	102.9	41.6	171	158.6	64.1	231	214.2	86.5	291	269.8	109.0
52	48.2	19.5	12	103.8	42.0	72	159.5	64.4	32	215.1	86.9	92	270.7	109.4
53	49.1	19.9	13	104.8	42.3	73	160.4	64.8	33	216.0	87.3	93	271.7	109.8
54	50.1	20.2	14	105.7	42.7	74	161.3	65.2	34	217.0	87.7	94	272.6	110.1
55	51.0	20.6	15	106.6	43.1	75	162.3	65.6	35	217.9	88.0	95	273.5	110.5
56	51.9	21.0	16	107.6	43.5	76	163.2	65.9	36	218.8	88.4	96	274.5	110.9
57	52.9	21.4	17	108.5	43.8	77	164.1	66.3	37	219.7	88.8	97	275.4	111.3
58	53.8	21.7	18	109.4	44.2	78	165.0	66.7	38	220.7	89.2	98	276.3	111.6
59	54.7	22.1	19	110.3	44.6	79	166.0	67.1	39	221.6	89.5	99	277.2	112.0
60	55.6	22.5	20	111.3	45.0	80	166.9	67.4	40	222.5	89.9	300	278.2	112.4
Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.

for 68 Degrees.

Difference of Latitude and Departure for 23 Degrees.

Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.
1	00.9	00.4	61	56.1	23.8	121	111.4	47.3	181	166.6	70.7	241	221.8	94.4
2	01.8	00.8	62	57.1	24.2	22	112.3	47.7	82	167.5	71.1	42	222.8	94.5
3	02.8	01.2	63	58.0	24.6	23	113.2	48.1	83	168.5	71.5	43	223.7	94.9
4	03.7	01.6	64	58.9	25.0	24	114.1	48.4	84	169.4	71.9	44	224.6	95.3
5	04.6	02.0	65	59.8	25.4	25	115.1	48.8	85	170.3	72.3	45	225.5	95.7
6	05.5	02.3	66	60.8	25.8	26	116.0	49.2	86	171.2	72.7	46	226.4	96.1
7	06.4	02.7	67	61.7	26.2	27	116.9	49.6	87	172.2	73.1	47	227.4	96.5
8	07.4	03.1	68	62.6	26.6	28	117.8	50.0	88	173.1	73.5	48	228.3	96.9
9	08.3	03.5	69	63.5	27.0	29	118.7	50.4	89	174.0	73.8	49	229.2	97.3
10	09.2	03.9	70	64.4	27.3	30	119.7	50.8	90	174.9	74.2	50	230.1	97.7
11	10.1	04.3	71	65.4	27.7	131	120.6	51.2	191	175.8	74.6	251	231.0	98.1
12	11.0	04.7	72	66.3	28.1	32	121.5	51.6	92	176.7	75.0	52	232.0	98.5
13	12.0	05.1	73	67.2	28.5	33	122.4	52.0	93	177.7	75.4	53	232.9	98.8
14	12.9	05.5	74	68.1	28.9	34	123.3	52.4	94	178.6	75.8	54	233.8	99.2
15	13.8	05.9	75	69.0	29.3	35	124.3	52.7	95	179.5	76.2	55	234.7	99.6
16	14.7	06.3	76	70.0	29.7	36	125.2	53.1	96	180.4	76.6	56	235.6	100.0
17	15.6	06.6	77	70.9	30.1	37	126.1	53.5	97	181.3	77.0	57	236.6	100.3
18	16.6	07.0	78	71.8	30.5	38	127.0	53.9	98	182.3	77.4	58	237.5	100.8
19	17.5	07.4	79	72.7	30.9	39	127.9	54.3	99	183.2	77.7	59	238.4	101.2
20	18.4	07.8	80	73.6	31.3	40	128.9	54.7	200	184.1	78.1	60	239.3	101.6
21	19.3	08.2	81	74.6	31.6	141	129.8	55.1	201	185.0	78.5	261	240.2	102.0
22	20.3	08.6	82	75.5	32.0	42	130.7	55.5	02	185.9	78.9	62	241.2	102.4
23	21.2	09.0	83	76.4	32.4	43	131.6	55.9	03	186.9	79.3	63	242.1	102.8
24	22.1	09.4	84	77.3	32.8	44	132.6	56.3	04	187.8	79.7	64	243.0	103.1
25	23.0	09.8	85	78.2	33.2	45	133.5	56.7	05	188.7	80.1	65	243.9	103.5
26	23.9	10.2	86	79.2	33.6	46	134.4	57.0	06	189.6	80.5	66	244.9	103.9
27	24.9	10.5	87	80.1	34.0	47	135.3	57.4	07	190.5	80.9	67	245.8	104.3
28	25.8	10.9	88	81.0	34.4	48	136.2	57.8	08	191.5	81.3	68	246.7	104.7
29	26.7	11.3	89	81.9	34.8	49	137.2	58.2	09	192.4	81.7	69	247.6	105.1
30	27.6	11.7	90	82.8	35.2	50	138.1	58.6	10	193.3	82.0	70	248.5	105.5
31	28.5	12.1	91	83.8	35.6	151	139.0	59.0	211	194.2	82.4	271	249.5	105.9
32	29.5	12.5	92	84.7	35.9	52	139.9	59.4	12	195.1	82.8	72	250.4	106.3
33	30.4	12.9	93	85.6	36.3	53	140.8	59.8	13	196.1	83.2	73	251.3	106.7
34	31.3	13.3	94	86.5	36.7	54	141.8	60.2	14	197.0	83.6	74	252.2	107.1
35	32.2	13.7	95	87.4	37.1	55	142.7	60.6	15	197.9	84.0	75	253.1	107.4
36	33.1	14.1	96	88.4	37.5	56	143.6	60.9	16	198.8	84.4	76	254.1	167.8
37	34.1	14.5	97	89.3	37.9	57	144.5	61.3	17	199.7	84.8	77	255.0	108.2
38	35.0	14.8	98	90.2	38.3	58	145.4	61.7	18	200.7	85.2	78	255.9	108.6
39	35.9	15.2	99	91.1	38.7	59	146.4	62.1	19	201.6	85.6	79	256.8	109.0
40	36.8	15.6	100	92.0	39.1	60	147.3	62.5	20	202.5	86.0	80	257.7	109.4
41	37.7	16.0	101	93.0	39.5	161	148.2	62.9	221	203.4	86.3	281	258.7	109.8
42	38.7	16.4	02	93.9	39.9	62	149.1	63.3	22	204.4	86.7	82	259.6	110.2
43	39.6	16.8	03	94.8	40.2	63	150.0	63.7	23	205.3	87.1	83	260.5	110.6
44	40.5	17.2	04	95.7	40.6	64	151.0	64.1	24	206.2	87.5	84	261.4	111.0
45	41.4	17.6	05	96.7	41.0	65	151.9	64.5	25	207.1	87.9	85	62.3	111.3
46	42.3	18.0	06	97.6	41.4	66	152.8	64.9	26	208.0	88.3	86	263.3	111.7
47	43.3	18.4	07	98.5	41.8	67	153.7	65.2	27	209.0	88.7	87	264.2	112.1
48	44.2	18.8	08	99.4	42.2	68	154.6	65.6	28	209.9	89.1	88	265.1	112.5
49	45.1	19.1	09	100.3	42.6	69	155.6	66.0	29	210.8	89.5	89	266.0	112.9
50	46.0	19.5	10	101.3	43.0	70	156.5	66.4	30	211.7	89.9	90	266.9	113.3
51	46.9	19.9	111	102.2	43.4	171	157.4	66.8	231	212.6	90.3	291	267.9	113.7
52	47.9	20.3	12	103.1	43.8	72	158.3	67.2	32	213.6	90.6	92	268.8	114.1
53	48.8	20.7	13	104.0	44.1	73	159.2	67.6	33	214.5	91.0	93	269.7	114.5
54	49.7	21.1	14	104.9	44.5	74	160.2	68.0	34	215.4	91.4	94	270.6	114.9
55	50.6	21.5	15	105.9	44.9	75	161.1	68.4	35	216.3	91.8	95	271.5	115.3
56	51.5	21.9	16	106.8	45.3	76	162.0	68.8	36	217.2	92.2	96	272.5	115.6
57	52.5	22.3	17	107.7	45.7	77	162.9	69.2	37	218.2	92.6	97	273.4	116.0
58	53.4	22.7	18	108.6	46.1	78	163.8	69.5	38	219.1	93.0	98	274.3	116.4
59	54.3	23.1	19	109.5	46.5	79	164.8	69.9	39	220.0	93.4	99	275.2	116.8
60	55.2	23.4	20	110.5	46.9	80	165.7	70.3	40	220.9	93.8	00	276.2	117.2
Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.

for 67 Degrees.

Difference of Latitude and Departure for 24 Degrees.

Dift	Lat.	Dep.	Dift	Lat.	Dep.	Dift	Lat.	Dep.	Dift	Lat.	Dep.	Dift	Lat.	Dep.
1	00.9	00.4	61	55.7	24.8	121	110.5	49.2	181	165.3	73.6	241	220.2	98.0
2	01.8	00.8	62	56.6	25.2	22	111.4	49.6	82	166.3	74.0	42	221.1	98.4
3	02.7	01.2	63	57.6	25.6	23	112.4	50.0	83	167.2	74.4	43	222.0	98.8
4	03.7	01.6	64	58.5	26.0	24	113.3	50.4	84	168.1	74.8	44	222.9	99.2
5	04.6	02.0	65	59.4	26.4	25	114.2	50.8	85	169.0	75.2	45	223.8	99.6
6	05.5	02.4	66	60.3	26.8	26	115.1	51.2	86	160.9	75.6	46	224.7	100.0
7	06.4	02.8	67	61.2	27.2	27	116.0	51.7	87	170.8	76.1	47	225.6	100.5
8	07.3	03.3	68	62.1	27.7	28	116.9	52.1	88	171.7	76.5	48	226.5	100.9
9	08.2	03.7	69	63.0	28.1	29	117.8	52.5	89	172.7	76.9	49	227.5	101.3
10	09.1	04.1	70	63.9	28.5	30	118.8	52.9	90	173.6	77.3	50	228.4	101.7
11	10.0	04.5	71	64.9	28.9	131	119.7	53.3	191	174.5	77.7	251	229.3	102.1
12	11.0	04.9	72	65.8	29.3	32	120.6	53.7	92	175.4	78.1	52	230.2	102.5
13	11.9	05.3	73	66.7	29.7	33	121.5	54.1	93	176.3	78.5	53	231.1	102.9
14	12.8	05.7	74	67.6	30.1	34	122.4	54.5	94	177.2	78.9	54	232.0	103.3
15	13.7	06.1	75	68.5	30.5	35	123.3	54.9	95	178.1	79.3	55	232.9	103.7
16	14.6	06.5	76	69.4	30.9	36	124.2	55.3	96	179.0	79.7	56	233.9	104.1
17	15.5	06.9	77	70.3	31.3	37	125.1	55.7	97	180.0	80.1	57	234.8	104.5
18	16.4	07.3	78	71.3	31.7	38	126.1	56.1	98	180.9	80.5	58	235.7	104.9
19	17.4	07.7	79	72.2	32.1	39	127.0	56.5	99	181.8	80.9	59	236.6	105.3
20	18.3	08.1	80	73.1	32.5	40	127.9	56.9	200	182.7	81.3	60	237.5	105.7
21	19.2	08.5	81	74.0	32.9	141	128.8	57.3	201	183.6	81.7	261	238.4	106.1
22	20.1	08.9	82	74.9	33.3	42	129.7	57.8	02	184.5	82.2	62	239.3	106.6
23	21.0	09.4	83	75.8	33.8	43	130.6	58.2	03	185.4	82.6	63	240.3	107.0
24	21.9	09.8	84	76.7	34.2	44	131.5	58.6	04	186.4	83.0	64	241.2	107.4
25	22.8	10.2	85	77.6	34.6	45	132.5	59.0	05	187.3	83.4	65	242.1	107.8
26	23.8	10.6	86	78.6	35.0	46	133.4	59.4	06	188.2	83.8	66	243.0	108.2
27	24.7	11.0	87	79.5	35.4	47	134.3	59.8	07	189.1	84.2	67	243.9	108.6
28	25.6	11.4	88	80.4	35.8	48	135.2	60.2	08	190.0	84.6	68	244.8	109.0
29	26.5	11.8	89	81.3	36.2	49	136.1	60.6	09	190.9	85.0	69	245.7	109.4
30	27.4	12.2	90	82.2	36.6	50	137.0	61.0	10	191.8	85.4	70	246.6	109.8
31	28.3	12.6	91	83.1	37.0	151	137.9	61.4	211	192.7	85.8	271	247.6	110.2
32	29.2	13.0	92	84.0	37.4	52	138.9	61.8	12	193.7	86.2	72	248.5	110.6
33	30.1	13.4	93	85.0	37.8	53	139.8	62.2	13	194.6	86.6	73	249.4	111.0
34	31.1	13.8	94	85.9	38.2	54	140.7	62.6	14	195.5	87.0	74	250.3	111.4
35	32.0	14.2	95	86.8	38.6	55	141.6	63.0	15	196.4	87.4	75	251.2	111.8
36	32.9	14.6	96	87.7	39.0	56	142.5	63.4	16	197.3	87.8	76	252.1	112.2
37	33.8	15.0	97	88.6	39.4	57	143.4	63.9	17	198.2	88.3	77	253.0	112.7
38	34.7	15.5	98	89.5	39.9	58	144.3	64.3	18	199.1	88.7	78	254.0	113.1
39	35.6	15.9	99	90.4	40.3	59	145.2	64.7	19	200.1	89.1	79	254.9	113.5
40	36.5	16.3	100	91.4	40.7	60	146.2	65.1	20	201.0	89.5	80	255.8	113.9
41	37.5	16.7	101	92.3	41.1	161	147.1	65.5	221	201.9	89.9	281	256.7	114.3
42	38.4	17.1	02	93.2	41.5	62	148.0	65.9	22	202.8	90.3	82	257.6	114.7
43	39.3	17.5	03	94.1	41.9	63	148.9	66.3	23	203.7	90.7	83	258.5	115.1
44	40.2	17.9	04	95.0	42.3	64	149.8	66.7	24	204.6	91.1	84	259.4	115.5
45	41.1	18.3	05	95.9	42.7	65	150.7	67.1	25	205.5	91.5	85	260.3	115.9
46	42.0	18.7	06	96.8	43.1	66	151.6	67.5	26	206.5	91.9	86	261.3	116.3
47	42.9	19.1	07	97.7	43.5	67	152.6	67.9	27	207.4	92.3	87	262.2	116.7
48	43.8	19.5	08	98.7	43.9	68	153.5	68.3	28	208.3	92.7	88	263.1	117.1
49	44.8	19.9	09	99.6	44.3	69	154.4	68.7	29	209.2	93.1	89	264.0	117.5
50	45.7	20.3	10	100.5	44.7	70	155.3	69.1	30	210.1	93.5	90	264.9	117.9
51	46.6	20.7	111	101.4	45.1	171	156.2	69.5	231	211.0	93.9	291	265.8	118.3
52	47.5	21.1	12	102.3	45.6	72	157.1	70.0	32	211.9	94.4	92	266.7	118.8
53	48.4	21.6	13	103.2	46.0	73	158.0	70.4	33	212.8	94.8	93	267.7	119.2
54	49.3	22.0	14	104.1	46.4	74	158.9	70.8	34	213.8	95.2	94	268.6	119.6
55	50.2	22.4	15	105.1	46.8	75	159.9	71.2	35	214.7	95.6	95	269.5	120.0
56	51.2	22.8	16	106.0	47.2	76	160.8	71.6	36	215.6	96.0	96	270.4	120.4
57	52.1	23.2	17	106.9	47.6	77	161.7	72.0	37	216.5	96.4	97	271.3	120.8
58	53.0	23.6	18	107.8	48.0	78	162.6	72.4	38	217.4	96.8	98	272.2	121.2
59	53.9	24.0	19	108.7	48.4	79	163.5	72.8	39	218.3	97.2	99	273.1	121.6
60	54.8	24.4	20	109.6	48.8	80	164.4	73.2	40	219.2	97.6	300	274.1	122.0
Dift	Dep.	Lat.	Dift	Dep.	Lat.	Dift	Dep.	Lat.	Dift	Dep.	Lat.	Dift	Dep.	Lat.

for 66 Degrees.

Difference of Latitude and Departure for 25 Degrees.

Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.
1	00.9	00.4	61	55.3	25.8	121	109.7	51.1	181	164.0	76.5	241	218.4	101.8
2	01.8	00.8	62	56.2	26.2	22	110.6	51.6	82	164.9	76.9	42	219.3	102.3
3	02.7	01.3	63	57.1	26.6	23	111.5	52.0	83	165.9	77.3	43	220.2	102.7
4	03.6	01.7	64	58.0	27.0	24	112.4	52.4	84	166.8	77.8	44	221.1	103.1
5	04.5	02.1	65	58.9	27.5	25	113.3	52.8	85	167.7	78.2	45	222.0	103.5
6	05.4	02.5	66	59.8	27.9	26	114.2	53.2	86	168.6	78.6	46	222.9	104.0
7	06.3	03.0	67	60.7	28.3	27	115.1	53.7	87	169.5	79.0	47	223.9	104.4
8	07.3	03.4	68	61.6	28.7	28	116.0	54.1	88	170.4	79.4	48	224.8	104.8
9	08.2	03.8	69	62.5	29.2	29	116.9	54.5	89	171.3	79.9	49	225.7	105.2
10	09.1	04.2	70	63.4	29.6	30	117.8	54.9	90	172.2	80.3	50	226.6	105.7
11	10.0	04.6	71	64.3	30.0	131	118.7	55.4	191	173.1	80.7	251	227.5	106.1
12	10.9	05.0	72	65.3	30.4	32	119.6	55.8	92	174.0	81.1	52	228.4	106.5
13	11.8	05.5	73	66.2	30.8	33	120.5	56.2	93	174.9	81.6	53	229.3	106.9
14	12.7	05.9	74	67.1	31.3	34	121.4	56.6	94	175.8	82.0	54	230.2	107.3
15	13.6	06.3	75	68.0	31.7	35	122.4	57.1	95	176.7	82.4	55	231.1	107.8
16	14.5	06.8	76	68.9	32.1	36	123.3	57.5	96	177.6	82.8	56	232.0	108.2
17	15.4	07.2	77	69.8	32.5	37	124.2	57.9	97	178.5	83.3	57	232.9	108.6
18	16.3	07.6	78	70.7	33.0	38	125.1	58.3	98	179.4	83.7	58	233.8	109.0
19	17.2	08.0	79	71.6	33.4	39	126.0	58.7	99	180.4	84.1	59	234.7	109.5
20	18.1	08.5	80	72.5	33.8	40	126.9	59.2	200	181.3	84.5	60	235.6	109.9
21	19.0	08.9	81	73.4	34.2	141	127.8	59.6	201	182.2	84.9	261	236.5	110.3
22	19.9	09.3	82	74.3	34.7	42	128.7	60.0	02	183.1	85.4	62	237.5	110.7
23	20.8	09.7	83	75.2	35.1	43	129.6	60.4	03	184.0	85.8	63	238.4	111.1
24	21.8	10.1	84	76.1	35.5	44	130.5	60.9	04	184.9	86.2	64	239.3	111.6
25	22.7	10.6	85	77.0	35.9	45	131.4	61.3	05	185.8	86.6	65	240.2	112.0
26	23.6	11.0	86	77.9	36.3	46	132.3	61.7	06	186.7	87.1	66	241.1	112.4
27	24.5	11.4	87	78.8	36.8	47	133.2	62.1	07	187.6	87.5	67	242.0	112.8
28	25.4	11.8	88	79.8	37.2	48	134.1	62.5	08	188.5	87.9	68	242.9	113.3
29	26.3	12.3	89	80.7	37.6	49	135.0	63.0	09	189.4	88.3	69	243.8	113.7
30	27.2	12.7	90	81.6	38.0	50	135.9	63.4	10	190.3	88.7	70	244.7	114.1
31	28.1	13.1	91	82.5	38.5	151	136.9	63.8	211	191.2	89.2	271	245.6	114.5
32	29.0	13.5	92	83.4	38.9	52	137.8	64.2	12	192.1	89.6	72	246.5	114.9
33	29.9	13.9	93	84.3	39.3	53	138.7	64.7	13	193.0	90.0	73	247.4	115.4
34	30.8	14.4	94	85.2	39.7	54	139.6	65.1	14	193.9	90.4	74	248.3	115.8
35	31.7	14.8	95	86.1	40.1	55	140.5	65.5	15	194.9	90.9	75	249.2	116.2
36	32.6	15.2	96	87.0	40.6	56	141.4	65.9	16	195.8	91.3	76	250.1	116.6
37	33.5	15.6	97	87.9	41.0	57	142.3	66.3	17	196.7	91.7	77	251.0	117.1
38	34.4	16.1	98	88.8	41.4	58	143.2	66.8	18	197.6	92.1	78	252.0	117.5
39	35.3	16.5	99	89.7	41.8	59	144.1	67.2	19	198.5	92.5	79	252.9	117.9
40	36.3	16.9	100	90.6	42.3	60	145.0	67.6	20	199.4	93.0	80	253.8	118.3
41	37.2	17.3	101	91.5	42.7	161	145.9	68.0	221	200.3	93.4	281	254.7	118.8
42	38.1	17.7	02	92.4	43.1	62	146.8	68.5	22	201.2	93.8	82	255.6	119.2
43	39.0	18.2	03	93.3	43.5	63	147.7	68.9	23	202.1	94.2	83	256.5	119.6
44	39.9	18.6	04	94.3	44.0	64	148.6	69.3	24	203.0	94.7	84	257.4	120.0
45	40.8	19.0	05	95.2	44.4	65	149.5	69.7	25	203.9	95.1	85	258.3	120.4
46	41.7	19.4	06	96.1	44.8	66	150.4	70.2	26	204.8	95.5	86	259.2	120.9
47	42.6	19.9	07	97.0	45.2	67	151.4	70.6	27	205.7	95.9	87	260.1	121.3
48	43.5	20.3	08	97.9	45.6	68	152.3	71.0	28	206.6	96.4	88	261.0	121.7
49	44.4	20.7	09	98.8	46.1	69	153.2	71.4	29	207.5	96.8	89	261.9	122.1
50	45.3	21.1	10	99.7	46.5	70	154.1	71.8	30	208.4	97.2	90	262.8	122.6
51	46.2	21.6	111	100.6	46.9	171	155.0	72.3	231	209.4	97.6	291	263.7	123.0
52	47.1	22.0	12	101.5	47.3	72	155.9	72.7	32	210.3	98.0	92	264.6	123.4
53	48.0	22.4	13	102.4	47.8	73	156.8	73.1	33	211.2	98.5	93	265.5	123.8
54	48.9	22.8	14	103.3	48.2	74	157.7	73.5	34	212.1	98.9	94	266.5	124.2
55	49.8	23.2	15	104.2	48.6	75	158.6	74.0	35	213.0	99.3	95	267.4	124.7
56	50.8	23.7	16	105.1	49.0	76	159.5	74.4	36	213.9	99.7	96	268.3	125.1
57	51.7	24.1	17	106.0	49.4	77	160.4	74.8	37	214.8	100.2	97	269.2	125.5
58	52.7	24.5	18	106.9	49.9	78	161.3	75.2	38	215.7	100.6	98	270.1	125.9
59	53.5	24.9	19	107.8	50.3	79	162.2	75.6	39	216.6	101.0	99	271.0	126.4
60	54.4	25.4	20	108.8	50.7	80	163.1	76.1	40	217.2	101.4	300	271.9	126.8
Diſt	Dep	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep	Lat.	Diſt	Dep.	Lat.

for 65 Degrees.

Difference of Latitude and Departure for 26 Degrees.

Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.
1	00.9	00.4	61	54.8	26.7	121	108.8	53.0	181	162.7	79.4	241	216.6	105.7
2	01.8	00.9	62	55.7	27.2	22	109.7	53.5	82	163.6	79.8	42	217.5	106.1
3	02.7	01.3	63	56.6	27.6	23	110.6	53.9	83	164.5	80.2	43	218.4	106.5
4	03.6	01.8	64	57.5	28.1	24	111.5	54.4	84	165.4	80.7	44	219.3	107.0
5	04.5	02.2	65	58.4	28.5	25	112.4	54.8	85	166.3	81.1	45	120.2	107.4
6	05.4	02.6	66	59.3	28.9	26	113.2	55.2	80	167.2	81.5	46	221.1	107.8
7	06.3	03.1	67	60.2	29.4	27	114.1	55.7	87	168.1	82.0	47	222.0	108.3
8	07.2	03.5	68	61.1	29.8	28	115.0	56.1	88	169.0	82.4	48	222.9	108.7
9	08.1	03.9	69	62.0	30.2	29	115.9	56.6	89	169.9	82.9	49	223.8	109.2
10	09.0	04.4	70	62.9	30.7	30	116.8	57.0	80	170.8	83.3	50	224.7	109.6
11	09.9	04.8	71	63.8	31.1	131	117.7	57.4	191	171.7	83.7	251	225.6	110.0
12	10.8	05.3	72	64.7	31.6	32	118.6	57.9	92	172.6	84.2	52	226.5	110.5
13	11.7	05.7	73	65.6	32.0	33	119.5	58.3	93	173.5	84.6	53	227.4	110.9
14	12.6	06.1	74	66.5	32.4	34	120.4	58.7	94	174.4	85.0	54	228.3	111.4
15	13.5	06.6	75	67.4	32.9	35	121.3	59.2	95	175.3	85.5	55	229.2	111.8
16	14.4	07.0	76	68.3	33.3	36	122.2	59.6	96	176.2	85.9	56	230.1	112.2
17	15.3	07.5	77	69.2	33.8	37	123.1	60.1	97	177.1	86.4	57	231.0	112.7
18	16.2	07.9	78	70.1	34.2	38	124.0	60.5	98	178.0	86.8	58	231.9	113.1
19	17.1	08.3	79	71.0	34.6	39	124.9	60.9	99	178.9	87.2	59	232.8	113.5
20	18.0	08.7	80	71.9	35.1	40	125.8	61.4	200	179.8	87.7	60	233.7	114.0
21	18.9	09.2	81	72.8	35.5	141	126.7	61.8	201	180.7	88.1	261	234.6	114.4
22	19.8	09.6	82	73.7	35.9	42	127.6	62.3	02	181.6	88.6	62	235.5	114.9
23	20.7	10.1	83	74.6	36.4	43	128.5	62.7	03	182.5	89.0	63	236.4	115.3
24	21.6	10.5	84	75.5	36.8	44	129.4	63.1	04	183.4	89.4	64	237.3	115.7
25	22.5	11.0	85	76.4	37.3	45	130.3	63.6	05	184.3	89.9	65	238.2	116.2
26	23.4	11.4	86	77.3	37.7	46	131.2	64.0	06	185.2	90.3	66	239.1	116.6
27	24.3	11.8	87	78.2	38.1	47	132.1	64.4	07	186.1	90.7	67	240.0	117.1
28	25.2	12.3	88	79.1	38.6	48	133.0	64.9	08	187.0	91.2	68	240.9	117.5
29	26.1	12.7	89	80.0	39.0	49	133.9	65.3	09	187.8	91.6	69	241.8	117.9
30	27.0	13.2	90	80.9	39.5	50	134.8	65.8	10	188.7	92.1	70	242.7	118.4
31	27.9	13.6	91	81.8	39.9	151	135.7	66.2	211	189.6	92.5	271	243.6	118.8
32	28.8	14.0	92	82.7	40.3	52	136.6	66.6	12	190.5	92.9	72	244.5	119.2
33	29.7	14.5	93	83.6	40.8	53	137.5	67.1	13	191.4	93.4	73	245.4	119.7
34	30.6	14.9	94	84.5	41.2	54	138.4	67.5	14	192.3	93.8	74	246.3	120.1
35	31.5	15.3	95	85.4	41.6	55	139.3	68.0	15	193.2	94.3	75	247.2	120.6
36	32.4	15.8	96	86.3	42.1	56	140.2	68.4	16	194.1	94.7	76	248.1	121.0
37	33.3	16.2	97	87.2	42.5	57	141.1	68.8	17	195.0	95.1	77	249.0	121.4
38	34.2	16.7	98	88.1	43.0	58	142.0	69.3	18	195.9	95.6	78	249.9	121.9
39	35.1	17.1	99	89.0	43.4	59	142.9	69.7	19	196.8	96.0	79	250.8	122.3
40	36.0	17.5	100	89.9	43.8	60	143.8	70.1	20	197.7	96.4	80	251.7	122.8
41	36.9	18.0	101	90.8	44.3	161	144.7	70.6	221	198.6	96.9	281	252.6	123.2
42	37.7	18.4	02	91.7	44.7	62	145.6	71.0	22	199.5	97.3	82	253.5	123.6
43	38.6	18.9	03	92.6	45.2	63	146.5	71.5	23	200.4	97.8	83	254.4	124.1
44	39.5	19.3	04	93.5	45.6	64	147.4	71.9	24	201.3	98.2	84	255.3	124.5
45	40.4	19.7	05	94.4	46.0	65	148.3	72.3	25	202.2	98.6	85	256.2	124.9
46	41.3	20.2	06	95.3	46.5	66	149.2	72.8	26	203.1	99.1	86	257.1	125.4
47	42.2	20.6	07	96.2	46.9	67	150.1	73.2	27	204.0	99.5	87	258.0	125.8
48	43.1	21.0	08	97.1	47.3	68	151.0	73.7	28	204.9	100.0	88	258.9	126.3
49	44.0	21.5	09	98.0	47.8	69	151.9	74.1	29	205.8	100.4	89	259.8	126.7
50	44.9	21.9	10	98.9	48.2	70	152.8	74.5	30	206.7	100.8	90	260.7	127.1
51	45.8	22.4	111	99.8	48.7	71	153.7	75.0	231	207.6	101.3	291	261.6	127.6
52	46.7	22.8	12	100.7	49.1	72	154.6	75.4	32	208.5	101.7	92	262.4	128.0
53	47.6	23.2	13	101.6	49.5	73	155.5	75.8	33	209.4	102.1	93	263.3	128.5
54	48.5	23.7	14	102.5	50.0	74	156.4	76.3	34	210.3	102.6	94	264.2	128.9
55	49.4	24.1	15	103.4	50.4	75	157.3	76.7	35	211.2	103.0	95	265.1	129.3
56	50.3	24.6	16	104.3	50.9	76	158.2	77.2	36	212.1	103.5	96	266.0	129.8
57	51.2	25.0	17	105.2	51.3	77	159.1	77.6	37	213.0	103.9	97	266.9	130.2
58	52.1	25.4	18	106.1	51.7	78	160.0	78.0	38	213.9	104.3	98	267.8	130.6
59	53.0	25.9	19	107.0	52.2	79	160.9	78.5	39	214.8	104.8	99	268.7	131.1
60	53.9	26.3	20	107.9	52.6	80	161.8	78.9	40	215.7	105.2	300	269.6	131.5
Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat

for 64 Degrees.

Difference of Latitude and Departure for 27 Degrees.

Diſt	Lat	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.
1	00.9	00.5	61	54.4	27.7	121	107.8	54.9	181	161.3	82.2	241	214.7	109.4
2	01.8	00.9	62	55.2	28.1	22	108.7	55.4	82	162.2	82.6	42	215.6	109.9
3	02.7	01.4	63	56.1	28.6	23	109.6	55.8	83	163.1	83.1	43	216.5	110.3
4	03.6	01.8	64	57.0	29.1	24	110.5	56.3	84	163.9	83.5	44	217.4	110.8
5	04.5	02.3	65	57.9	29.5	25	111.4	56.8	85	164.8	84.0	45	218.3	111.2
6	05.3	02.7	66	58.8	30.0	26	112.3	57.2	86	165.7	84.4	46	219.2	111.7
7	06.2	03.2	67	59.7	30.4	27	113.2	57.7	87	166.6	84.9	47	220.1	112.1
8	07.1	03.6	68	60.6	30.9	28	114.0	58.1	88	167.5	85.4	48	221.0	112.6
9	08.0	04.1	69	61.5	31.3	29	114.9	58.6	89	168.4	85.8	49	221.9	113.0
10	08.9	04.5	70	62.4	31.8	30	115.8	59.0	90	169.3	86.3	50	222.8	113.5
11	09.8	05.0	71	63.3	32.2	131	116.7	59.5	191	170.2	86.7	251	223.6	114.0
12	10.7	05.4	72	64.2	32.7	32	117.6	59.9	92	171.1	87.2	52	224.5	114.4
13	11.6	05.9	73	65.0	33.1	33	118.5	60.4	93	172.0	87.6	53	225.4	114.9
14	12.5	06.4	74	65.9	33.6	34	119.4	60.8	94	172.9	88.1	54	226.3	115.3
15	13.4	06.8	75	66.8	34.1	35	120.3	61.3	95	173.7	88.5	55	227.2	115.8
16	14.3	07.3	76	67.7	34.5	36	121.2	61.7	96	174.6	89.0	56	228.1	116.2
17	15.1	07.7	77	68.6	35.0	37	122.1	62.2	97	175.5	89.4	57	229.0	116.7
18	16.0	08.2	78	69.5	35.4	38	123.0	62.7	98	176.4	89.9	58	229.9	117.1
19	16.9	08.6	79	70.4	35.9	39	123.8	63.1	99	177.3	90.3	59	230.8	117.6
20	17.8	09.1	80	71.3	36.3	40	124.7	63.6	200	178.2	90.8	60	231.7	118.0
21	18.7	09.5	81	72.2	36.8	141	125.6	64.0	201	179.1	91.3	261	232.6	118.5
22	19.6	10.0	82	73.1	37.2	42	126.5	64.5	02	180.0	91.7	62	233.4	118.9
23	20.5	10.4	83	74.0	37.7	43	127.4	64.9	03	180.9	92.2	63	234.3	119.4
24	21.4	10.9	84	74.8	38.1	44	128.3	65.4	04	181.8	92.6	64	235.2	119.9
25	22.3	11.4	85	75.7	38.6	45	129.2	65.8	05	182.7	93.1	65	236.1	120.3
26	23.2	11.8	86	76.6	39.0	46	130.1	66.3	06	183.5	93.5	66	237.0	120.8
27	24.1	12.3	87	77.5	39.5	47	131.0	66.7	07	184.4	94.0	67	237.9	121.2
28	24.9	12.7	88	78.4	40.0	48	131.9	67.2	08	185.3	94.4	68	238.8	121.7
29	25.8	13.2	89	79.3	40.4	49	132.8	67.6	09	186.2	94.9	69	239.7	122.1
30	26.7	13.6	90	80.2	40.9	50	133.7	68.1	10	187.1	95.3	70	240.6	122.6
31	27.6	14.1	91	81.1	41.3	151	134.5	68.6	211	188.0	95.8	271	241.5	123.3
32	28.5	14.5	92	82.0	41.8	52	135.4	69.0	12	188.9	96.2	72	242.4	123.5
33	29.4	15.0	93	82.9	42.2	53	136.3	69.5	13	189.8	96.7	73	243.2	123.9
34	30.3	15.4	94	83.8	42.7	54	137.2	69.9	14	190.7	97.2	74	244.1	124.4
35	31.2	15.9	95	84.6	43.1	55	138.1	70.4	15	191.6	97.6	75	245.0	124.9
36	32.1	16.3	96	85.5	43.6	56	139.0	70.8	16	192.5	98.1	76	245.9	125.3
37	33.0	16.8	97	86.4	44.0	57	139.9	71.3	17	193.3	98.5	77	246.8	125.8
38	33.9	17.3	98	87.3	44.5	58	140.8	71.7	18	194.2	99.0	78	247.7	126.2
39	34.7	17.7	99	88.2	44.9	59	141.7	72.2	19	195.1	99.4	79	248.6	126.7
40	35.6	18.2	100	89.1	45.4	60	142.6	72.6	20	196.0	99.9	80	249.5	127.1
41	36.5	18.6	101	90.0	45.9	161	143.5	73.1	221	196.9	100.3	281	250.4	127.6
42	37.4	19.1	02	90.9	46.3	62	144.3	73.5	22	197.8	100.8	82	251.3	128.0
43	38.3	19.5	03	91.8	46.8	63	145.2	74.0	23	198.7	101.2	83	252.2	128.5
44	39.2	20.0	04	92.7	47.2	64	146.1	74.5	24	199.6	101.7	84	253.0	128.9
45	40.1	20.4	05	93.6	47.7	65	147.0	74.9	25	200.5	102.2	85	253.9	129.4
46	41.0	20.9	06	94.4	48.1	66	147.9	75.4	26	201.4	102.6	86	254.8	129.8
47	41.9	21.3	07	95.3	48.6	67	148.8	75.8	27	202.3	103.1	87	255.7	130.3
48	42.8	21.8	08	96.2	49.0	68	149.7	76.3	28	203.1	103.5	88	256.6	130.8
49	43.7	22.2	09	97.1	49.5	69	150.6	76.7	29	204.0	104.0	89	257.5	131.2
50	44.6	22.7	10	98.0	49.9	70	151.5	77.2	30	204.9	104.4	90	258.4	131.7
51	45.4	23.2	111	98.9	50.4	171	152.4	77.6	231	205.8	104.9	291	259.3	132.1
52	46.3	23.6	12	99.8	50.8	72	153.3	78.1	32	206.7	105.3	92	260.2	132.6
53	47.2	24.1	13	100.7	51.3	73	154.1	78.5	33	207.6	105.8	93	261.1	133.0
54	48.1	24.5	14	101.6	51.8	74	155.0	79.0	34	208.5	106.2	94	262.0	133.5
55	49.0	25.0	15	102.5	52.2	75	155.9	79.5	35	209.4	106.7	95	262.8	133.9
56	49.9	25.4	16	103.4	52.7	76	156.8	79.9	36	210.3	107.1	96	263.7	134.4
57	50.8	25.9	17	104.2	53.1	77	157.7	80.4	37	211.2	107.6	97	264.6	134.8
58	51.7	26.3	18	105.1	53.6	78	158.6	80.8	38	212.1	108.1	98	265.5	135.3
59	52.6	26.8	19	106.0	54.0	79	159.5	81.3	39	212.9	108.5	99	266.4	135.7
60	53.5	27.2	20	106.9	54.5	80	160.4	81.7	40	213.8	109.0	300	267.3	136.2
Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.

for 63 Degrees.

Difference of Latitude and Departure for 28 Degrees.

Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.
1	00.9	00.5	61	53.9	28.6	121	106.8	56.8	181	159.8	85.0	241	212.8	113.1
2	01.8	00.9	62	54.7	29.1	22	107.7	57.3	82	160.7	85.4	42	213.7	113.6
3	02.6	01.4	63	55.6	29.6	23	108.6	57.7	83	161.6	85.9	43	214.6	114.1
4	03.5	01.9	64	56.5	30.0	24	109.5	58.2	84	162.5	86.4	44	215.5	114.6
5	04.4	02.3	65	57.4	30.5	25	110.4	58.7	85	163.4	86.9	45	216.3	115.0
6	05.3	02.8	66	58.3	31.0	26	111.3	59.2	86	164.2	87.3	46	217.2	115.5
7	06.2	03.3	67	59.2	31.5	27	112.1	59.6	87	165.1	87.8	47	218.1	115.9
8	07.1	03.8	68	60.0	31.9	28	113.0	60.1	88	166.0	88.3	48	219.0	116.4
9	07.9	04.3	69	60.9	32.4	29	113.9	60.6	89	166.9	88.7	49	219.9	116.9
10	08.8	04.7	70	61.8	32.9	30	114.8	61.0	90	167.8	89.2	50	220.8	117.4
11	09.7	05.2	71	62.7	33.3	131	115.7	61.5	191	168.7	89.7	251	221.6	117.8
12	10.6	05.6	72	63.6	33.8	32	116.6	62.0	92	169.5	90.1	52	222.5	118.3
13	11.5	06.1	73	64.5	34.3	33	117.4	62.4	93	170.4	90.6	53	223.4	118.8
14	12.4	06.6	74	65.3	34.7	34	118.3	62.9	94	171.3	91.1	54	224.3	119.2
15	13.2	07.0	75	66.2	35.2	35	119.2	63.4	95	172.2	91.6	55	225.2	119.7
16	14.1	07.5	76	67.1	35.7	36	120.1	63.9	96	173.1	92.0	56	226.0	120.2
17	15.0	08.0	77	68.0	36.2	37	121.0	64.3	97	174.0	92.5	57	226.9	120.7
18	15.9	08.5	78	68.9	36.6	38	121.9	64.8	98	174.8	93.0	58	227.8	121.1
19	16.8	08.9	79	69.8	37.1	39	122.7	65.3	99	175.7	93.4	59	228.7	121.6
20	17.7	09.4	80	70.6	37.6	40	123.6	65.7	200	176.6	93.9	60	229.6	122.1
21	18.5	09.9	81	71.5	38.0	141	124.5	66.2	201	177.5	94.4	261	230.5	122.5
22	19.4	10.3	82	72.4	38.5	42	125.4	66.7	02	178.4	94.8	62	231.3	123.0
23	20.3	10.8	83	73.3	39.0	43	126.3	67.1	03	179.2	95.3	63	132.2	123.5
24	21.2	11.3	84	74.2	39.4	44	127.2	67.6	04	180.1	95.8	64	233.1	123.9
25	22.1	11.7	85	75.1	39.9	45	128.0	68.1	05	181.0	96.2	65	234.0	124.4
26	23.0	12.2	86	75.9	40.4	46	128.9	68.5	06	181.9	96.7	66	234.9	124.9
27	23.8	12.7	87	76.8	40.8	47	129.8	69.0	07	182.8	97.2	67	235.8	125.4
28	24.7	13.1	88	77.7	41.3	48	130.7	69.5	08	183.7	97.7	68	236.6	125.8
29	25.6	13.6	89	78.6	41.8	49	131.6	70.0	09	184.5	98.1	69	237.5	126.3
30	26.5	14.1	90	79.5	42.3	50	132.5	70.4	10	185.4	98.6	70	238.4	126.8
31	27.4	14.6	91	80.4	42.7	151	133.3	70.9	211	186.3	99.1	271	239.3	127.2
32	28.3	15.0	92	81.2	43.2	52	134.2	71.4	12	187.2	99.5	72	240.2	127.7
33	29.1	15.5	93	82.1	43.7	53	135.1	71.8	13	188.1	100.0	73	241.1	128.2
34	30.0	16.0	94	83.0	44.1	54	136.0	72.3	14	189.0	100.5	74	241.9	128.6
35	30.9	16.4	95	83.9	44.6	55	136.9	72.8	15	189.8	100.9	75	242.8	129.1
36	31.8	16.9	96	84.8	45.1	56	137.7	73.2	16	190.7	101.4	76	243.7	129.6
37	32.7	17.4	97	85.7	45.5	57	138.6	73.7	17	191.6	101.9	77	244.6	130.1
38	33.6	17.8	98	86.5	46.0	58	139.5	74.2	18	192.5	102.4	78	245.5	130.5
39	34.5	18.3	99	87.4	46.5	59	140.4	74.6	19	193.4	102.8	79	246.4	131.0
40	35.3	18.8	100	88.3	47.0	60	141.3	75.1	20	194.3	103.3	80	247.2	131.5
41	36.2	19.2	101	89.2	47.4	161	142.2	75.6	221	195.1	103.8	281	248.1	131.9
42	37.1	19.7	02	90.1	47.9	62	143.0	76.1	22	196.0	104.2	82	249.0	132.4
43	38.0	20.2	03	90.9	48.4	63	143.9	76.5	23	196.9	104.7	83	249.9	132.9
44	38.9	20.7	04	91.8	48.8	64	144.8	77.0	24	197.8	105.2	84	250.8	133.3
45	39.7	21.1	05	92.7	49.3	65	145.7	77.5	25	198.7	105.6	85	251.7	133.8
46	40.6	21.6	06	93.6	49.8	66	146.6	77.9	26	199.6	106.1	86	252.5	134.3
47	41.5	22.1	07	94.5	50.2	67	147.5	78.4	27	200.4	106.6	87	253.4	134.7
48	42.4	22.5	08	95.4	50.7	68	148.3	78.9	28	201.3	107.0	88	254.3	135.2
49	43.3	23.0	09	96.2	51.2	69	149.2	79.3	29	202.2	107.5	89	255.2	135.7
50	44.2	23.5	10	97.1	51.6	70	150.1	79.8	30	203.1	108.0	90	256.1	136.1
51	45.0	23.9	111	98.0	52.1	171	151.0	80.3	231	204.0	108.5	291	257.0	136.6
52	45.9	24.4	12	98.9	52.6	72	151.9	80.8	32	204.9	108.9	92	257.8	137.1
53	46.8	24.9	13	99.8	53.1	73	152.8	81.2	33	205.7	109.4	93	258.7	137.6
54	47.7	25.4	14	100.7	53.5	74	153.6	81.7	34	206.6	109.9	94	259.6	138.0
55	48.6	25.8	15	101.5	54.0	75	154.5	82.2	35	207.5	110.3	95	260.5	138.5
56	49.4	26.3	16	102.4	54.5	76	155.4	82.6	36	208.4	110.8	96	261.4	139.0
57	50.3	26.8	17	103.3	54.9	77	156.3	83.1	37	209.3	111.3	97	262.3	139.4
58	51.2	27.2	18	104.2	55.4	78	157.2	83.6	38	210.2	111.7	98	263.1	139.9
59	52.1	27.7	19	105.1	55.9	79	158.1	84.0	39	211.0	112.2	99	264.0	140.4
60	53.0	28.2	20	106.0	56.3	80	158.9	84.5	40	211.9	112.7	300	264.9	140.9
Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.

for 62 Degrees.

Difference of Latitude and Departure for 29 Degrees.

Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Lat.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.
1	01.9	00.5	61	53.4	29.6	121	105.8	58.7	181	158.3	87.7	241	210.8	116.8
2	01.7	01.0	62	54.2	30.1	22	106.7	59.1	82	159.2	88.2	42	211.7	117.3
3	02.6	01.5	63	55.1	30.5	23	107.6	59.6	83	160.1	88.7	43	212.5	117.8
4	03.5	01.9	64	56.0	31.0	24	108.5	60.1	84	160.9	89.2	44	213.4	118.3
5	04.4	02.4	65	56.8	31.5	25	109.3	60.6	85	161.8	89.7	45	214.3	118.8
6	05.2	02.9	66	57.7	32.0	26	110.2	61.1	86	162.7	90.2	46	215.2	119.3
7	06.1	03.4	67	58.6	32.5	27	111.1	61.6	87	163.6	90.7	47	216.0	119.7
8	07.0	03.9	68	59.5	33.0	28	111.9	62.1	88	164.4	91.1	48	216.9	120.2
9	07.9	04.4	69	60.3	33.5	29	112.8	62.5	89	165.3	91.6	49	217.9	120.7
10	08.7	04.8	70	61.2	33.9	30	113.7	63.0	90	166.2	92.1	50	218.7	121.2
11	09.6	05.3	71	62.1	34.4	131	114.6	63.5	191	167.0	92.6	251	219.5	121.7
12	10.5	05.8	72	63.0	34.9	32	115.4	64.0	92	167.9	93.1	52	220.4	122.2
13	11.4	06.3	73	63.8	35.4	33	116.3	64.5	93	168.8	93.6	53	221.3	122.7
14	12.2	06.8	74	64.7	35.9	34	117.2	65.0	94	169.7	94.1	54	222.2	123.1
15	13.1	07.3	75	65.6	36.4	35	118.1	65.4	95	170.5	94.5	55	223.0	123.6
16	14.0	07.8	76	66.5	36.8	36	118.9	65.9	96	171.4	95.0	56	223.9	124.1
17	14.9	08.2	77	67.3	37.3	37	119.8	66.4	97	172.3	95.5	57	224.8	124.6
18	15.7	08.7	78	68.2	37.8	38	120.7	66.9	98	173.2	96.0	58	225.6	125.1
19	16.6	09.2	79	69.1	38.3	39	121.6	67.4	99	174.0	96.5	59	226.5	125.6
20	17.5	09.7	80	70.0	38.8	40	122.4	67.9	200	174.9	97.0	60	227.4	126.0
21	18.4	10.2	81	70.8	39.3	141	123.3	68.4	201	175.8	97.4	261	228.3	126.5
22	19.2	10.7	82	71.7	39.8	42	124.2	68.9	02	176.7	97.9	62	229.1	127.0
23	20.1	11.2	83	72.6	40.2	43	125.1	69.3	03	177.5	98.4	63	230.0	127.5
24	21.0	11.6	84	73.5	40.7	44	125.9	69.8	04	178.4	98.9	64	230.9	128.0
25	21.9	12.1	85	74.3	41.2	45	126.8	70.3	05	179.3	99.4	65	231.8	128.5
26	22.7	12.6	86	75.2	41.7	46	127.7	70.8	06	180.2	99.9	66	232.6	129.0
27	23.6	13.1	87	76.1	42.2	47	128.6	71.3	07	181.0	100.4	67	233.5	129.4
28	24.5	13.6	88	77.0	42.7	48	129.4	71.8	08	181.9	100.8	68	234.4	129.9
29	25.4	14.1	89	77.8	43.1	49	130.3	72.2	09	182.8	101.4	69	235.3	130.4
30	26.2	14.5	90	78.7	43.6	50	131.2	72.7	10	183.7	101.8	70	236.1	130.9
31	27.1	15.0	91	79.6	44.1	151	132.1	73.2	211	184.5	102.3	271	237.0	131.4
32	28.0	15.5	92	80.5	44.6	52	132.9	73.7	12	185.4	102.8	72	237.9	131.9
33	28.9	16.0	93	81.3	45.1	53	133.8	74.2	13	186.3	103.3	73	238.8	132.4
34	29.7	16.5	94	82.2	45.6	54	134.7	74.7	14	187.2	103.7	74	239.6	132.8
35	30.6	17.0	95	83.1	46.1	55	135.6	75.1	15	188.0	104.2	75	240.5	133.3
36	31.5	17.5	96	84.0	46.5	56	136.4	75.6	16	188.9	104.7	76	241.4	133.8
37	32.4	17.9	97	84.8	47.0	57	137.3	76.1	17	189.8	105.2	77	242.3	134.3
38	33.2	18.4	98	85.7	47.5	58	138.2	76.6	18	190.7	105.7	78	243.1	134.8
39	34.1	18.9	99	86.6	48.0	59	139.1	77.1	19	191.5	106.2	79	244.0	135.3
40	35.0	19.4	100	87.5	48.5	60	139.9	77.6	20	192.4	106.7	80	244.9	135.7
41	35.9	19.9	101	88.3	49.0	161	140.8	78.1	221	193.3	107.1	281	245.8	136.2
42	36.7	20.4	02	89.2	49.4	62	141.7	78.5	22	194.2	107.6	82	246.6	136.7
43	37.6	20.8	03	90.1	49.9	63	142.6	79.0	23	195.0	108.1	83	247.5	137.2
44	38.5	21.3	04	91.0	50.4	64	143.4	79.5	24	195.9	108.6	84	248.4	137.7
45	39.4	21.8	05	91.8	50.9	65	144.3	80.0	25	196.8	109.1	85	249.3	138.2
46	40.2	22.3	06	92.7	51.4	66	145.2	80.5	26	197.7	109.6	86	250.1	138.7
47	41.1	22.8	07	93.6	51.9	67	146.1	81.0	27	198.5	110.0	87	251.0	139.1
48	42.0	23.3	08	94.5	52.4	68	146.9	81.4	28	199.4	110.5	88	251.9	139.6
49	42.9	23.8	09	95.3	52.8	69	147.8	81.9	29	200.3	111.0	89	252.8	140.1
50	43.7	24.2	10	96.2	53.3	70	148.7	82.4	30	201.2	111.5	90	253.6	140.6
51	44.6	24.7	111	97.1	53.8	171	149.6	82.9	231	202.0	112.0	291	254.5	141.1
52	45.5	25.2	12	98.0	54.3	72	150.4	83.4	32	202.9	112.5	92	255.4	141.6
53	46.4	25.7	13	98.8	54.8	73	151.3	83.9	33	203.8	113.0	93	256.3	142.0
54	47.2	26.2	14	99.7	55.3	74	152.2	84.4	34	204.7	113.4	94	257.1	142.5
55	48.1	26.7	15	100.6	55.8	75	153.1	84.8	35	205.5	113.9	95	258.0	143.0
56	49.0	27.1	16	101.5	56.2	76	153.9	85.3	36	206.4	114.4	96	258.9	143.5
57	49.9	27.6	17	102.3	56.7	77	154.8	85.8	37	207.3	114.9	97	259.8	144.0
58	50.7	28.1	18	103.2	57.2	78	155.7	86.3	38	208.2	115.4	98	260.6	144.5
59	51.6	28.6	19	104.1	57.7	79	156.6	86.8	39	209.0	115.9	99	261.5	145.0
60	52.5	29.1	20	105.0	58.2	80	157.4	87.3	40	209.9	116.4	300	262.4	145.4
Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.

for 61 Degrees.

Difference of Latitude and Departure for 30 Degrees.

Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.
1	00.9	00.5	61	52.8	30.5	121	104.8	60.5	181	156.7	90.5	241	208.7	120.5
2	01.7	01.0	62	53.7	31.0	22	105.7	61.0	82	157.6	91.0	42	209.6	121.0
3	02.6	01.5	63	54.6	31.5	23	106.5	61.5	83	158.5	91.5	43	210.4	121.5
4	03.5	02.0	64	55.4	32.0	24	107.4	62.0	84	159.3	92.0	44	211.3	122.0
5	04.3	02.5	65	56.3	32.5	25	108.3	62.5	85	160.2	92.5	45	212.2	122.5
6	05.2	03.0	66	57.2	33.0	26	109.1	63.0	86	161.1	93.0	46	213.0	123.0
7	06.1	03.5	67	58.0	33.5	27	110.0	63.5	87	161.9	93.5	47	213.9	123.5
8	06.9	04.0	68	58.9	34.0	28	110.8	64.0	88	162.8	94.0	48	214.8	124.0
9	07.8	04.5	69	59.8	34.5	29	111.7	64.5	89	163.7	94.5	49	215.6	124.5
10	08.7	05.0	70	60.6	35.0	30	112.6	65.0	90	164.5	95.0	50	216.5	125.0
11	09.5	05.5	71	61.5	35.5	131	113.4	65.5	191	165.4	95.5	251	217.4	125.5
12	10.4	06.0	72	62.4	36.0	32	114.3	66.0	92	166.3	96.0	52	218.2	126.0
13	11.3	06.5	73	63.2	36.5	33	115.2	66.5	93	167.1	96.5	53	219.1	126.5
14	12.1	07.0	74	64.1	37.0	34	116.0	67.0	94	168.0	97.0	54	220.0	127.0
15	13.0	07.5	75	65.0	37.5	35	116.9	67.5	95	168.9	97.5	55	220.8	127.5
16	13.9	08.0	76	65.8	38.0	36	117.8	68.0	96	169.7	98.0	56	221.7	128.0
17	14.7	08.5	77	66.7	38.5	37	118.6	68.5	97	170.6	98.5	57	222.6	128.5
18	15.6	09.0	78	67.5	39.0	38	119.5	69.0	98	171.5	99.0	58	223.4	129.0
19	16.5	09.5	79	68.4	39.5	39	120.4	69.5	99	172.3	99.5	59	224.3	129.5
20	17.3	10.0	80	69.3	40.0	40	121.2	70.0	200	173.2	100.0	60	225.2	130.0
21	18.2	10.5	81	70.1	40.5	141	122.1	70.5	201	174.1	100.5	261	226.0	130.5
22	19.1	11.0	82	71.0	41.0	42	123.0	71.0	02	174.9	101.0	62	226.9	131.0
23	19.9	11.5	83	71.9	41.5	43	123.8	71.5	03	175.8	101.5	63	227.8	131.5
24	20.8	12.0	84	72.7	42.0	44	124.7	72.0	04	176.7	102.0	64	228.6	132.0
25	21.7	12.5	85	73.6	42.5	45	125.6	72.5	05	177.5	102.5	65	229.5	132.5
26	22.5	13.0	86	74.5	43.0	46	126.4	73.0	06	178.4	103.0	66	230.4	133.0
27	23.4	13.5	87	75.3	43.5	47	127.3	73.5	07	179.3	103.5	67	231.2	133.5
28	24.2	14.0	88	76.2	44.0	48	128.2	74.0	08	180.1	104.0	68	232.1	134.0
29	25.1	14.5	89	77.1	44.5	49	129.0	74.5	09	181.0	104.5	69	233.0	134.5
30	26.0	15.0	90	77.9	45.0	50	129.9	75.0	10	181.9	105.0	70	233.8	135.0
31	26.8	15.5	91	78.8	45.5	151	130.8	75.5	211	182.7	105.5	271	234.7	135.5
32	27.7	16.0	92	79.7	46.0	52	131.7	76.0	12	183.6	106.0	72	235.6	136.0
33	28.6	16.5	93	80.5	46.5	53	132.5	76.5	13	184.5	106.5	73	236.4	136.5
34	29.4	17.0	94	81.4	47.0	54	133.4	77.0	14	185.3	107.0	74	237.3	137.0
35	30.3	17.5	95	82.3	47.5	55	134.2	77.5	15	186.2	107.5	75	238.2	137.5
36	31.2	18.0	96	83.1	48.0	56	135.1	78.0	16	187.1	108.0	76	239.0	138.0
37	32.0	18.5	97	84.0	48.5	57	136.0	78.5	17	187.9	108.5	77	239.9	138.5
38	32.9	19.0	98	84.9	49.0	58	136.8	79.0	18	188.8	109.0	78	240.7	139.0
39	33.8	19.5	99	85.7	49.5	59	137.7	79.5	19	189.7	109.5	79	241.6	139.5
40	34.6	20.0	100	86.6	50.0	60	138.6	80.0	20	190.5	110.0	80	242.5	140.0
41	35.5	20.5	101	87.5	50.5	161	139.4	80.5	221	191.4	110.5	281	243.3	140.5
42	36.4	21.0	02	88.3	51.0	62	140.3	81.0	22	192.3	111.0	82	244.2	141.0
43	37.2	21.5	03	89.2	51.5	63	141.2	81.5	23	193.1	111.5	83	245.1	141.5
44	38.1	22.0	04	90.1	52.0	64	142.0	82.0	24	194.0	112.0	84	245.9	142.0
45	39.0	22.5	05	90.9	52.5	65	142.9	82.5	25	194.9	112.5	85	246.8	142.5
46	39.8	23.0	06	91.8	53.0	66	143.8	83.0	26	195.7	113.0	86	247.7	143.0
47	40.7	23.5	07	92.7	53.5	67	144.6	83.5	27	196.6	113.5	87	248.5	143.5
48	41.5	24.0	08	93.5	54.0	68	145.5	84.0	28	197.4	114.0	88	249.4	144.0
49	42.4	24.5	09	94.4	54.5	69	146.4	84.5	29	198.3	114.5	89	250.3	144.5
50	43.3	25.0	10	95.3	55.0	70	147.2	85.0	30	199.2	115.0	90	251.1	145.0
51	44.2	25.5	111	96.1	55.5	171	148.1	85.5	231	200.0	115.5	291	252.0	145.5
52	45.0	26.0	12	97.0	56.0	72	149.0	86.0	32	200.9	116.0	92	252.9	146.0
53	45.9	26.5	13	97.9	56.5	73	149.8	86.5	33	201.8	116.5	93	253.7	146.5
54	46.8	27.0	14	98.7	57.0	74	150.7	87.0	34	202.6	117.0	94	254.6	147.0
55	47.6	27.5	15	99.6	57.5	75	151.6	87.5	35	203.5	117.5	95	255.5	147.5
56	48.5	28.0	16	100.5	58.0	76	152.4	88.0	36	204.4	118.0	96	256.3	148.0
57	49.4	28.5	17	101.3	58.5	77	153.3	88.5	37	205.2	118.5	97	257.2	148.5
58	50.2	29.0	18	102.2	59.0	78	154.1	89.0	38	206.1	119.0	98	258.1	149.0
59	51.1	29.5	19	103.1	59.5	79	155.0	89.5	39	207.0	119.5	99	258.9	149.5
60	52.0	30.0	20	103.9	60.0	80	155.9	90.0	40	207.8	120.0	300	259.8	150.0
Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.

for 60 Degrees.

Difference of Latitude and Departure for 31 Degrees.

Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.
1	00.9	00.5	61	52.3	31.4	121	103.7	62.3	181	155.1	93.2	241	206.5	124.1
2	01.7	01.0	62	53.1	31.9	22	104.6	62.8	82	156.0	93.7	42	207.4	124.6
3	02.6	01.5	63	54.0	32.4	23	105.4	63.3	83	156.8	94.2	43	208.3	125.1
4	03.4	02.1	64	54.8	33.0	24	106.3	63.9	84	157.7	94.8	44	209.1	125.6
5	04.3	02.6	65	55.7	33.5	25	107.1	64.4	85	158.5	95.3	45	210.0	126.2
6	05.1	03.1	66	56.6	34.0	26	108.0	64.9	86	159.4	95.8	46	210.8	126.7
7	06.0	03.6	67	57.4	34.5	27	108.8	65.4	87	160.3	96.3	47	211.7	127.2
8	06.9	04.1	68	58.3	35.0	28	109.7	65.9	88	161.1	96.3	48	212.5	127.7
9	07.7	04.6	69	59.1	35.5	29	110.6	66.4	89	162.0	97.3	49	213.4	128.2
10	08.6	05.2	70	60.0	36.1	30	111.4	67.0	90	162.8	97.9	50	214.3	128.8
11	09.4	05.7	71	60.8	36.6	131	112.3	67.5	191	163.7	98.4	251	215.1	129.3
12	10.3	06.2	72	61.7	37.1	32	113.1	68.0	92	164.5	98.9	52	216.0	129.8
13	11.1	06.7	73	62.6	37.6	33	114.0	68.5	93	165.4	99.4	53	216.8	130.3
14	12.0	07.2	74	63.4	38.1	34	114.8	69.0	94	166.3	99.9	54	217.7	130.8
15	13.9	07.7	75	64.3	38.6	35	115.7	69.5	95	167.1	100.4	55	218.5	131.3
16	13.7	08.2	76	65.1	39.1	36	116.6	70.0	96	168.0	100.9	56	219.4	131.8
17	14.6	08.8	77	66.0	39.7	37	117.4	70.6	97	168.8	101.5	57	220.2	132.4
18	15.4	09.3	78	66.8	40.2	38	118.3	71.1	98	169.7	102.0	58	221.1	132.9
19	16.3	09.8	79	67.7	40.7	39	119.1	71.6	99	170.5	102.5	59	222.0	133.4
20	17.1	10.3	80	68.6	41.2	40	120.0	72.1	200	171.4	103.0	60	222.8	133.9
21	18.0	10.8	81	69.4	41.7	141	120.8	72.6	201	172.3	103.5	261	223.7	134.4
22	18.9	11.3	82	70.3	42.2	42	121.7	73.1	02	173.1	104.0	62	224.5	134.9
23	19.7	11.8	83	71.1	42.7	43	122.6	73.6	03	174.0	104.5	63	225.4	135.4
24	20.6	12.4	84	72.0	43.3	44	123.4	74.2	04	174.8	105.0	64	226.2	136.0
25	21.4	12.9	85	72.8	43.8	45	124.3	74.7	05	175.7	105.6	65	227.1	136.5
26	22.3	13.4	86	73.7	44.3	46	125.1	75.2	06	176.5	106.1	66	228.0	137.0
27	23.1	13.9	87	74.6	44.8	47	126.0	75.7	07	177.4	106.6	67	228.8	137.5
28	24.0	14.4	88	75.4	45.3	48	126.8	76.2	08	178.3	107.1	68	229.7	138.0
29	24.9	14.9	89	76.3	45.8	49	127.7	76.7	09	179.1	107.6	69	230.5	138.5
30	25.7	15.5	90	77.1	46.4	50	128.6	77.3	10	180.0	108.2	70	231.4	139.1
31	26.6	16.0	91	78.0	46.9	151	129.4	77.8	211	180.8	108.7	271	232.2	139.6
32	27.4	16.5	92	78.8	47.4	52	130.3	78.3	12	181.7	109.2	72	233.1	140.1
33	28.3	17.0	93	79.7	47.9	53	131.1	78.8	13	182.5	109.7	73	234.0	140.6
34	29.1	17.5	94	80.6	48.4	54	132.0	79.3	14	183.4	110.2	74	234.8	141.1
35	30.0	18.0	95	81.4	48.9	55	132.8	79.8	15	184.3	110.7	75	235.7	141.6
36	31.9	18.5	96	82.3	49.4	56	133.7	80.3	16	185.1	111.2	76	236.5	142.1
37	30.7	19.1	97	83.1	50.0	57	134.5	80.9	17	186.0	111.8	77	237.4	142.7
38	32.6	19.6	98	84.0	50.5	58	135.4	81.4	18	186.8	112.3	78	238.2	143.2
39	33.4	20.1	99	84.8	51.0	59	136.3	81.9	19	187.7	112.8	79	239.1	143.7
40	34.3	20.6	100	85.7	51.5	60	137.1	82.4	20	188.5	113.3	80	240.0	144.2
41	35.1	21.1	101	86.6	52.0	161	138.0	82.9	221	189.4	113.8	281	240.8	144.7
42	36.0	21.6	02	87.4	52.5	62	138.8	83.4	22	190.3	114.3	82	241.7	145.2
43	36.9	22.1	03	88.3	53.0	63	139.7	83.9	23	191.1	114.8	83	242.5	145.7
44	37.7	22.6	04	89.1	53.6	64	140.5	84.5	24	192.0	115.4	84	243.4	146.3
45	38.6	23.2	05	90.0	54.1	65	141.4	85.0	25	192.8	115.9	85	244.2	146.8
46	39.4	23.7	06	90.8	54.6	66	142.3	85.5	26	193.7	116.4	86	245.1	147.3
47	40.3	24.2	07	91.7	55.1	67	143.1	86.0	27	194.5	116.9	87	246.0	147.8
48	41.1	24.7	08	92.6	55.6	68	144.0	86.5	28	195.4	117.4	88	246.8	148.3
49	42.0	25.2	09	93.4	56.1	69	144.8	87.0	29	196.3	117.9	89	247.7	148.8
50	42.9	25.8	10	94.3	56.7	70	145.7	87.6	30	197.1	118.5	90	248.5	149.4
51	43.7	26.3	111	95.1	57.2	171	[illegible]	88.1	231	198.0	119.0	291	249.4	149.4
52	44.6	26.8	12	96.0	57.7	72	147.4	88.6	32	198.8	119.5	92	250.2	150.4
53	45.4	27.5	13	96.8	58.2	73	148.3	89.1	33	199.7	120.0	93	251.1	150.9
54	46.3	27.8	14	97.7	58.7	74	149.1	89.6	34	200.5	120.5	94	252.0	151.4
55	47.1	28.3	15	98.6	59.2	75	150.0	90.1	35	201.4	121.0	95	252.8	151.9
56	47.0	28.8	16	99.4	59.7	76	150.8	90.6	36	202.3	121.5	96	253.7	152.4
57	48.8	29.4	17	100.3	60.3	77	151.7	91.2	37	203.1	122.1	97	254.5	153.0
58	49.7	29.9	18	101.1	60.8	78	152.5	91.7	38	204.0	122.6	98	255.4	153.5
59	50.6	30.4	19	102.0	61.3	79	153.4	92.2	39	204.8	123.1	99	256.2	154.0
60	51.4	30.9	20	102.8	61.8	80	154.3	92.7	40	205.7	123.6	300	257.1	154.5
Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.

for 59 Degrees.

Difference of Latitude and Departure for 32 Degrees.

Dist	Lat	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.
1	00.8	00.5	61	51.7	32.3	121	102.6	64.1	181	153.5	95.9	241	204.4	127.7
2	01.7	01.1	62	52.6	32.9	22	103.5	64.7	82	154.3	96.5	42	205.2	128.3
3	02.5	01.6	63	53.4	33.4	23	104.3	65.2	83	155.2	97.0	43	206.	128.8
4	03.4	02.1	64	54.3	33.9	24	105.2	65.7	84	156.0	97.5	44	206.9	129.3
5	04.2	02.6	65	55.1	34.5	25	106.0	66.3	85	156.9	98.1	45	207.8	129.9
6	05.1	03.2	66	56.0	35.0	26	106.8	66.8	86	157.7	98.6	46	208.6	130.4
7	05.9	03.7	67	56.8	35.5	27	107.7	67.3	87	158.6	99.1	47	209.5	130.9
8	07.8	04.2	68	57.7	36.0	28	108.5	67.8	88	159.4	99.6	48	210.3	131.4
9	07.6	04.8	69	58.5	36.6	29	109.4	68.4	89	160.3	100.2	49	211.2	132.0
10	08.5	05.3	70	59.4	37.1	30	110.2	68.9	90	161.1	100.7	50	212.0	132.5
11	09.3	05.8	71	60.2	37.6	131	111 1	69.4	191	162.0	101.2	251	212.8	133.0
12	10.2	06.4	72	61.1	38.2	32	111.9	70.0	92	162.8	101.8	52	213.7	133.6
13	11.0	06.9	73	61.9	38.7	33	112.8	70.5	93	163.7	102.3	53	214.5	134.1
14	11.9	07.4	74	62.8	39.2	34	113.6	71.0	94	164.5	102.8	54	215.4	134.6
15	12.7	08.0	75	63.6	39.8	35	114.5	71.6	95	165.4	103.4	55	216.2	135.2
16	13.6	08.5	76	64.4	40.3	36	115.3	72.1	96	166.2	103.9	56	217.1	135.7
17	14.4	09.0	77	65.3	40.8	37	116.2	72.6	97	167.1	104.4	57	217.9	136.2
18	15.3	09.5	78	66.1	41.3	38	117.0	73.1	98	167.9	104.9	58	218.8	136.7
19	16.1	10.1	79	67.0	41.9	39	117.9	73.7	99	168.8	105.5	59	219.6	137.3
20	17.0	10.6	80	67.8	42.4	40	118.8	74.2	200	169.6	106.0	60	220.5	137.8
21	17.8	11.1	81	68.7	42.9	141	119.6	74.7	201	170.4	106.5	261	221.3	138.3
22	18.7	11.7	82	69.5	43.5	42	120.4	75.3	02	171.3	107.1	62	222.2	138.9
23	19.5	12.2	83	70.4	44.0	43	121.3	75.8	03	172.1	107.6	63	223.0	139.4
24	20.4	12.7	84	71.2	44.5	44	122.1	76.3	04	173.0	108.1	64	223.9	139.9
25	21.2	13.3	85	72.1	45.1	45	123.0	76.9	05	173.8	108.7	65	224.7	140.5
26	22.0	13.8	86	72.9	45.6	46	123.8	77.4	06	174.7	109.2	66	225.6	141.0
27	22.9	14.3	87	73.8	46.	47	124.7	77.9	07	175.5	109.7	67	226.4	141.5
28	23.7	14.8	88	74.6	46.6	48	125.5	78.4	08	176.4	110.2	68	227.3	142.0
29	24.6	15.4	89	75.5	47.2	49	126.4	79.0	09	177.2	110.8	69	228.1	142.6
30	25.4	15.9	90	76.3	47.7	50	127.2	79.5	10	178.1	111.3	70	229.0	143.1
31	26.3	16.4	91	77.2	48.2	151	128.0	80.0	211	178.9	111.8	271	230.8	143.6
32	27.1	17.0	92	78.0	48.8	52	128.9	80.6	12	179.8	112.4	72	230.7	144.2
33	28.0	17.5	93	78.9	49.3	53	129.7	81.1	13	180.5	112.9	73	231.5	144.7
34	28.8	18.0	94	79.7	49.8	54	130.6	81.6	14	181.5	113.4	74	232.4	145.2
35	29.7	18.6	95	80.6	50.4	55	131.4	82.2	15	182.3	114.0	75	233.2	145.8
36	30.5	19.1	96	81.4	50.9	56	132.3	82.7	16	183.2	114.5	76	234.0	146.3
37	31.4	19.6	97	82.3	51.4	57	133.1	83.2	17	184.0	115.0	77	234.9	146.8
38	32.2	20.1	98	83.1	51.9	58	134.0	83 7	18	184.9	115.5	78	235.7	147.3
39	33.1	20.7	99	84.0	52.5	59	134.8	84.3	19	185.7	116.1	79	236.6	147.9
40	33.9	21.2	100	84.8	53.0	60	135.7	84.8	20	186.6	116.6	80	237.4	148.4
41	34.8	21.7	101	85.6	53.5	161	136.5	85.3	221	187.4	117.1	281	238.3	148.9
42	35.6	22.3	02	86.5	54.1	62	137.4	85.9	22	188.3	117.7	82	239.1	149.5
43	36.5	22.8	03	87.3	54.6	63	138.2	86.4	23	189.1	118.2	83	240.0	150.0
44	37.3	23.3	04	88.2	55.1	64	139.1	86.9	24	190.0	118.7	84	240.8	150.5
45	38.2	23.9	05	89.0	55.7	65	139.9	87.5	25	190.8	119.3	85	241.7	151.1
46	39.0	24.4	06	89.9	56.2	66	140.8	88.0	26	191.6	119.8	86	242.5	151.6
47	39.9	24.9	07	90.7	56.7	67	141.6	88.5	27	192.5	120.3	87	243.4	152.1
48	40.7	25.4	08	91.6	57.2	68	142.5	89.0	28	193.3	120.8	88	244.2	152.6
49	41.6	26.0	09	92.4	57.8	69	143.3	89.6	29	194.2	121.4	89	245.1	153.2
50	42.4	26.5	10	93.3	58.3	70	144.2	90.1	30	195.0	121.9	90	245 9	153.7
51	43.2	27.0	111	94.1	58.8	171	145.	90.6	231	195.9	122.4	291	246.8	154.2
52	44.1	27.[illegible]	12	95.0	59.4	72	145.9	91.2	32	190.7	123.0	92	247.6	154.8
53	44.9	28.1	[illegible]	95.8	59.9	73	146.7	91.7	33	197.6	123.5	93	248.5	155.3
54	45.8	28.6	14	96.7	60.0	74	147.6	92.2	34	198.4	124.0	94	249.3	155.8
55	46.6	29.2	15	97.5	61.0	75	148.4	92.8	35	199.3	124.6	95	250.2	156.4
56	47.5	29.7	16	98.4	61.5	76	149.2	93.3	36	200.1	125.1	96	251.0	156.9
57	48.3	30.2	17	99.1	62.0	77	150.1	93.8	37	201.0	125.6	97	251.9	157.4
58	49.2	30.7	18	100.1	62.5	78	150.9	94.3	38	201.8	126.1	98	252.7	157.9
59	50.0	31.3	19	100.9	63.1	79	151.8	94.9	39	202.7	126.7	99	253.6	158.5
60	50.9	31.8	20	101.8	63.6	80	152.6	95.4	40	203.5	127.2	300	254.4	159.0
Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.

for 58 Degrees.

Difference of Latitude and Departure for 33 Degrees.

Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.
1	00.8	00.5	61	51.2	33.2	121	101.5	65.9	181	151.8	98.6	241	202.1	131.2
2	01.7	01.1	62	52.0	33.8	22	102.3	66.4	82	152.6	99.1	42	202.9	131.8
3	02.5	01.6	63	52.8	34.3	23	103.1	67.0	83	153.5	99.7	43	203.8	132.3
4	03.4	02.2	64	53.7	34.9	24	104.0	67.5	84	154.3	100.2	44	204.6	132.9
5	04.2	02.7	65	54.5	35.4	25	104.8	68.1	85	155.1	100.8	45	205.5	133.4
6	05.0	03.3	66	55.3	35.9	26	105.7	68.6	86	156.0	101.3	46	206.3	134.0
7	05.9	03.8	67	56.2	36.5	27	106.5	69.2	87	156.8	101.8	47	207.1	134.5
8	06.7	04.4	68	57.0	37.0	28	107.3	69.7	88	157.7	102.4	48	208.0	135.1
9	07.5	04.9	69	57.9	37.6	29	108.2	70.3	89	158.5	102.9	49	208.8	135.6
10	08.4	05.4	70	58.7	38.1	30	109.0	70.8	90	159.3	103.5	50	209.7	136.2
11	09.2	06.0	71	59.5	38.7	131	109.9	71.3	191	160.2	104.0	251	210.5	136.7
12	10.1	06.5	72	60.4	39.2	32	110.7	71.9	92	161.0	104.6	52	211.3	137.2
13	10.9	07.1	73	61.2	39.8	33	111.5	72.4	93	161.8	105.1	53	212.2	137.8
14	11.7	07.6	74	62.1	40.3	34	112.4	73.0	94	162.7	105.7	54	213.0	138.3
15	12.6	08.2	75	62.9	40.8	35	113.2	73.5	95	163.5	106.2	55	213.8	138.9
16	13.4	08.7	76	63.7	41.4	36	114.0	74.1	96	164.4	106.7	56	214.7	139.4
17	14.3	09.3	77	64.6	41.9	37	114.9	74.6	97	165.2	107.3	57	215.5	140.0
18	15.1	09.8	78	65.4	42.5	38	115.7	75.2	98	166.0	107.8	58	216.4	140.5
19	15.9	10.3	79	66.2	43.0	39	116.6	75.7	99	166.9	108.4	59	217.2	141.1
20	16.8	10.9	80	67.1	43.6	40	117.4	76.2	200	167.7	108.9	60	218.0	141.6
21	17.6	11.4	81	67.9	44.1	141	118.2	76.8	201	168.6	109.5	261	218.9	142.1
22	18.4	12.0	82	68.8	44.7	42	119.1	77.3	02	169.4	110.0	62	219.7	142.7
23	19.3	12.5	83	69.6	45.2	43	119.9	77.9	03	170.2	110.6	63	220.6	143.2
24	20.1	13.1	84	70.4	45.7	44	120.8	78.4	04	171.1	111.1	64	221.4	143.8
25	21.0	13.6	85	71.3	46.3	45	121.6	79.0	05	171.9	111.6	65	222.2	144.3
26	21.8	14.2	86	72.1	46.8	46	122.4	79.5	06	172.8	112.2	66	223.1	144.9
27	22.6	14.7	87	73.0	47.4	47	123.3	80.1	07	173.6	112.7	67	223.9	145.4
28	23.5	15.2	88	73.8	47.9	48	124.1	80.6	08	174.4	113.3	68	224.7	146.0
29	24.3	15.8	89	74.6	48.5	49	125.0	81.1	09	175.3	113.8	69	225.6	146.5
30	25.2	16.3	90	75.5	49.0	50	125.8	81.7	10	176.1	114.4	70	226.4	147.1
31	26.0	16.9	91	76.3	49.6	151	126.6	82.2	211	176.9	114.9	271	227.3	147.6
32	26.8	17.4	92	77.2	50.1	52	127.5	82.8	12	177.8	115.5	72	228.1	148.1
33	27.7	18.0	93	78.0	50.6	53	128.3	83.3	13	178.6	116.0	73	228.9	148.7
34	28.5	18.5	94	78.8	51.2	54	129.1	83.9	14	179.5	116.5	74	229.8	149.2
35	29.4	19.1	95	79.7	51.7	55	130.0	84.4	15	180.3	117.1	75	230.6	149.8
36	30.2	19.6	96	80.5	52.3	56	130.8	85.0	16	181.1	117.6	76	231.5	150.3
37	31.0	20.2	97	81.3	52.8	57	131.7	85.5	17	182.0	118.2	77	232.3	150.9
38	31.9	20.7	98	82.2	53.4	58	132.5	86.0	18	182.8	118.7	78	233.1	151.4
39	32.7	21.2	99	83.0	53.9	59	133.3	86.6	19	183.7	119.3	79	234.0	151.9
40	33.5	21.8	100	83.9	54.5	60	134.2	87.1	20	184.5	119.8	80	234.8	152.5
41	34.4	22.3	101	84.7	55.0	161	135.0	87.7	221	185.3	120.4	281	235.6	153.0
42	35.2	22.9	02	85.5	55.5	62	135.9	88.2	22	186.2	120.9	82	236.5	153.6
43	36.1	23.4	03	86.4	56.1	63	136.7	88.8	23	187.0	121.4	83	237.3	154.1
44	36.9	24.0	04	87.2	56.6	64	137.5	89.3	24	187.8	122.0	84	238.2	154.7
45	37.7	24.5	05	88.1	57.2	65	138.4	89.9	25	188.7	122.5	85	239.0	155.2
46	38.6	25.1	06	88.9	57.7	66	139.2	90.4	26	189.5	123.1	86	239.8	155.8
47	39.4	25.6	07	89.7	58.3	67	140.0	92.9	27	190.4	123.6	87	240.7	156.3
48	40.3	26.1	08	90.6	58.8	68	140.9	91.5	28	191.2	124.2	88	241.5	156.8
49	41.1	26.7	09	91.4	59.4	69	141.7	92.0	29	192.0	124.7	89	242.4	157.4
50	41.9	27.2	10	92.2	59.9	70	142.6	92.6	30	192.9	125.3	90	243.2	157.9
51	42.8	27.8	111	93.1	60.5	171	143.4	93.1	231	193.7	125.8	291	244.0	158.5
52	43.6	28.3	12	93.9	61.0	72	144.2	93.7	32	194.6	126.3	92	244.9	159.0
53	44.4	28.9	13	94.8	61.5	73	145.1	94.2	33	195.4	126.9	93	245.7	159.6
54	45.3	29.4	14	95.6	62.1	74	145.9	94.8	34	196.2	127.4	94	246.5	160.1
55	46.1	30.0	15	96.4	62.6	75	146.8	95.3	35	197.1	128.0	95	247.4	160.7
56	47.0	30.5	16	97.3	63.2	76	147.6	95.8	36	197.9	128.5	96	248.2	161.2
57	47.8	31.0	17	98.1	63.7	77	148.4	96.4	37	198.7	129.1	97	249.1	161.7
58	48.6	31.6	18	99.0	64.3	78	149.3	96.9	38	199.6	129.6	98	249.9	162.3
59	49.5	32.1	19	99.8	64.8	79	150.1	97.5	39	200.4	130.2	99	250.7	162.8
60	50.3	32.7	20	100.6	65.4	80	150.9	98.0	40	201.3	130.7	300	251.6	163.4
Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.

G g

for 57 Degrees.

S A.

Difference of Latitude and Departure for 34 Degrees.

Dist	Lat	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.
1	00.8	00.6	61	50.6	34.1	121	100.3	67.7	181	150.0	101.2	241	199.8	134.8
2	01.7	01.1	62	51.4	34.7	22	101.1	68.2	82	150.9	101.8	42	200.6	135.3
3	02.5	01.7	63	52.2	35.2	23	102.0	68.8	83	151.7	102.3	43	201.4	135.9
4	03.3	02.2	64	53.1	35.8	24	102.8	69.3	84	152.5	102.9	44	202.3	136.4
5	04.1	02.8	65	53.9	36.3	25	103.6	69.9	85	153.4	103.5	45	203.1	137.0
6	05.0	03.4	66	54.7	36.9	26	104.5	70.5	86	154.2	104.0	46	203.9	137.6
7	05.8	03.9	67	55.5	37.5	27	105.3	71.0	87	155.0	104.6	47	204.8	138.1
8	06.6	04.5	68	56.4	38.0	28	106.1	71.6	88	155.9	105.1	48	205.6	138.7
9	07.5	05.0	69	57.2	38.6	29	106.9	72.1	89	156.7	105.7	49	206.4	139.2
10	08.3	05.6	70	58.0	39.1	30	107.8	72.7	90	157.5	106.2	50	207.3	139.8
11	09.1	06.2	71	58.9	39.7	131	108.6	73.3	191	158.3	106.8	251	208.1	140.4
12	09.9	06.7	72	59.7	40.3	32	109.4	73.8	92	159.2	107.4	52	208.9	140.9
13	10.8	07.3	73	60.5	40.8	33	110.3	74.4	93	160.0	107.9	53	209.7	141.5
14	11.6	07.8	74	61.3	41.4	34	111.1	74.9	94	160.8	108.5	54	210.6	142.0
15	12.4	08.4	75	62.2	41.9	35	111.9	75.5	95	161.7	109.0	55	211.4	142.6
16	13.3	08.9	76	63.0	42.5	36	112.7	76.1	96	162.5	109.6	56	212.2	143.2
17	14.1	09.5	77	63.8	43.1	37	113.6	76.6	97	163.3	110.2	57	213.1	143.7
18	14.9	10.1	78	64.7	43.6	38	114.4	77.2	98	164.1	110.7	58	213.9	144.3
19	15.8	10.6	79	65.5	44.2	39	115.2	77.7	99	165.0	111.3	59	214.7	144.8
20	16.6	11.2	80	66.3	44.7	40	116.1	78.3	200	165.8	111.8	60	215.5	145.4
21	17.4	11.7	81	67.1	45.3	141	116.9	78.8	201	166.6	112.4	261	216.4	146.0
22	18.2	12.3	82	68.0	45.9	42	117.7	79.4	02	167.5	113.0	62	217.2	146.5
23	19.1	12.9	83	68.8	46.4	43	118.5	80.0	03	168.3	113.5	63	218.0	147.1
24	19.9	13.4	84	69.6	47.0	44	119.4	80.5	04	169.1	114.1	64	218.9	147.6
25	20.7	14.0	85	70.5	47.5	45	120.2	81.1	05	169.9	114.6	65	219.7	148.2
26	21.6	14.5	86	71.3	48.1	46	121.0	81.6	06	170.8	115.2	66	220.5	148.7
27	22.4	15.1	87	72.1	48.7	47	121.9	82.2	07	171.6	115.8	67	221.3	149.3
28	23.2	15.7	88	73.0	49.2	48	122.7	82.8	08	172.4	116.3	68	222.2	149.9
29	24.0	16.2	89	73.8	49.8	49	123.5	83.3	09	173.3	116.9	69	223.0	150.4
30	24.9	16.8	90	74.6	50.3	50	124.4	83.9	10	174.1	117.4	70	223.8	151.0
31	25.7	17.3	91	75.4	50.9	151	125.2	84.4	211	174.9	118.0	271	224.7	151.5
32	26.5	17.9	92	76.3	51.4	52	126.0	85.0	12	175.7	118.6	72	225.5	152.1
33	27.4	18.5	93	77.1	52.0	53	126.8	85.6	13	176.6	119.1	73	226.3	152.7
34	28.2	19.0	94	77.9	52.6	54	127.7	86.1	14	177.4	119.7	74	227.1	153.2
35	29.0	19.6	95	78.8	53.1	55	128.5	86.7	15	178.2	120.2	75	228.0	153.8
36	29.8	20.1	96	79.6	53.7	56	129.3	87.2	16	179.1	120.8	76	228.8	154.3
37	30.7	20.7	97	80.4	54.2	57	130.2	87.8	17	179.9	121.3	77	229.6	154.9
38	31.5	21.2	98	81.2	54.8	58	131.0	88.4	18	180.7	121.9	78	230.5	155.5
39	32.3	21.8	99	82.1	55.4	59	131.8	88.9	19	181.6	122.5	79	231.3	156.0
40	33.2	22.4	100	82.9	55.9	60	132.6	89.5	20	182.4	123.0	80	232.1	156.6
41	34.0	22.9	101	83.7	56.5	161	133.5	90.0	221	183.2	123.6	281	232.9	157.1
42	34.8	23.5	02	84.6	57.0	62	134.3	90.6	22	184.0	124.1	82	233.8	157.7
43	35.6	24.0	03	85.4	57.6	63	135.1	91.1	23	184.9	124.7	83	234.6	158.3
44	36.5	24.6	04	86.2	58.2	64	136.0	91.7	24	185.7	125.3	84	235.4	158.8
45	37.3	25.2	05	87.0	58.7	65	136.8	92.3	25	186.5	125.8	85	236.3	159.4
46	38.1	25.7	06	87.9	59.3	66	137.6	92.8	26	187.4	126.4	86	237.1	159.9
47	39.0	26.3	07	88.7	59.8	67	138.4	93.4	27	188.2	126.9	87	237.9	160.5
48	39.8	26.8	08	89.5	60.4	68	139.3	93.9	28	189.0	127.5	88	238.8	161.0
49	40.6	27.4	09	90.4	61.0	69	140.1	94.5	29	189.8	128.1	89	239.6	161.6
50	41.5	28.0	10	91.2	61.5	70	140.9	95.1	30	190.7	128.6	90	240.4	162.2
51	42.3	28.5	111	92.0	62.1	171	141.8	95.6	231	191.5	129.2	291	241.2	162.7
52	43.1	29.1	12	92.8	62.6	72	142.6	96.2	32	192.3	129.7	92	242.1	163.3
53	43.9	29.6	13	93.7	63.2	73	143.4	96.7	33	193.2	130.3	93	242.9	163.8
54	44.8	30.2	14	94.5	63.7	74	144.2	97.3	34	194.0	130.9	94	243.7	164.4
55	45.6	30.8	15	95.3	64.3	75	145.1	97.9	35	194.8	131.4	95	244.6	165.0
56	46.4	31.3	16	96.2	64.9	76	145.9	98.4	36	195.6	132.0	96	245.4	165.6
57	47.3	31.9	17	97.0	65.4	77	146.7	99.0	37	196.5	132.5	97	246.2	166.1
58	48.1	32.4	18	97.8	66.0	78	147.6	99.5	38	197.3	133.1	98	247.0	166.6
59	48.9	33.0	19	98.7	66.5	79	148.4	100.1	39	198.1	133.6	99	247.9	167.2
60	49.7	33.6	20	99.5	67.1	80	149.2	100.7	40	199.0	134.2	300	248.7	167.8
Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.

for 56 Degrees.

Difference of Latitude and Departure for 35 Degrees.

Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Lat.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.
1	00.8	00.6	61	50.0	35.0	121	99.1	69.4	181	148.2	103.8	241	197.4	138.2
2	01.6	01.1	62	50.8	35.6	22	99.9	70.0	82	149.1	104.4	42	198.2	138.8
3	02.5	01.7	63	51.6	36.1	23	100.7	70.5	83	149.9	105.0	43	199.0	139.4
4	03.3	02.3	64	52.4	36.7	24	101.6	71.1	84	150.7	105.5	44	199.8	139.9
5	04.1	02.9	65	53.2	37.3	25	102.4	71.7	85	151.5	106.1	45	200.6	140.5
6	04.9	03.4	66	54.1	37.9	26	103.2	72.3	86	152.3	106.7	46	201.5	141.1
7	05.7	04.0	67	54.9	38.4	27	104.0	72.8	87	153.1	107.2	47	202.3	141.7
8	06.6	04.6	68	55.7	39.0	28	104.8	73.4	88	154.0	107.8	48	203.1	142.2
9	07.4	05.2	69	56.5	39.6	29	105.6	74.0	89	154.8	108.4	49	203.9	142.8
10	08.2	05.7	70	57.3	40.1	30	106.5	74.6	90	155.6	109.0	50	204.7	143.4
11	09.0	06.3	71	58.1	40.7	131	107.3	75.1	191	156.4	109.5	251	205.6	143.9
12	09.8	06.9	72	59.0	41.3	32	108.1	75.7	92	157.2	110.1	52	206.4	144.5
13	10.6	07.5	73	59.8	41.9	33	108.9	76.3	93	158.1	110.7	53	207.2	145.1
14	11.5	08.0	74	60.6	42.4	34	109.7	76.8	94	158.9	111.3	54	208.0	145.7
15	12.3	08.6	75	61.4	43.0	35	110.6	77.4	95	159.7	111.8	55	208.8	146.2
16	13.1	09.2	76	62.2	43.6	36	111.4	78.0	96	160.5	112.4	56	209.6	146.8
17	13.9	09.7	77	63.1	44.2	37	112.2	78.6	97	161.3	113.0	57	210.5	147.4
18	14.7	10.3	78	63.9	44.7	38	113.0	79.1	98	162.2	113.6	58	211.3	148.0
19	15.6	10.9	79	64.7	45.3	39	113.8	79.7	99	163.0	114.1	59	212.1	148.5
20	16.4	11.5	80	65.5	45.9	40	114.6	80.3	200	163.8	114.7	60	212.9	149.1
21	17.2	12.0	81	66.3	46.5	141	115.5	80.9	201	164.6	115.3	261	213.8	149.7
22	18.0	12.6	82	67.2	47.0	42	116.3	81.4	02	165.4	115.8	62	214.6	150.3
23	18.8	13.2	83	68.0	47.6	43	117.1	82.0	03	166.3	116.4	63	215.4	150.8
24	19.6	13.8	84	68.8	48.2	44	117.9	82.6	04	167.1	117.0	64	216.2	151.4
25	20.5	14.3	85	69.6	48.7	45	118.8	83.2	05	167.9	117.6	65	217.0	152.0
26	21.3	14.9	86	70.4	49.3	46	119.6	83.7	06	168.7	118.1	66	217.8	152.6
27	22.1	15.5	87	71.3	49.9	47	120.4	84.3	07	169.5	118.7	67	218.7	153.1
28	22.9	16.1	88	72.1	50.5	48	121.2	84.9	08	170.3	119.3	68	219.5	153.7
29	23.8	16.6	89	72.9	51.0	49	122.0	85.5	09	171.2	119.9	69	220.3	154.3
30	24.6	17.2	90	73.7	51.6	50	122.8	86.0	10	172.0	120.4	70	221.1	154.8
31	25.4	17.8	91	74.5	52.2	151	123.7	86.6	211	172.8	121.0	271	221.9	155.4
32	26.2	18.4	92	75.3	52.8	52	124.5	87.2	12	173.6	121.6	72	222.8	156.0
33	27.0	18.9	93	76.2	53.3	53	125.3	87.7	13	174.4	122.2	73	223.6	156.6
34	27.8	19.5	94	77.0	53.9	54	126.1	88.3	14	175.3	122.7	74	224.4	157.1
35	28.7	20.1	95	77.8	54.5	55	126.9	88.9	15	176.1	123.3	75	225.2	157.7
36	29.5	20.6	96	78.6	55.1	56	127.8	89.5	16	176.9	123.9	76	226.0	158.3
37	30.3	21.2	97	79.4	55.6	57	128.6	90.0	17	177.7	124.4	77	226.9	158.9
38	31.1	21.8	98	80.3	56.2	58	129.4	90.6	18	178.5	125.0	78	227.7	159.4
39	31.9	22.4	99	81.1	56.8	59	130.2	91.2	19	179.4	125.6	79	228.5	160.0
40	32.8	22.9	100	81.9	57.4	60	131.0	91.8	20	180.2	126.2	80	229.3	160.6
41	33.0	23.5	101	82.7	57.9	161	131.9	92.3	221	181.0	126.7	281	230.1	161.2
42	34.4	24.1	02	83.5	58.5	62	132.7	92.9	22	181.8	127.3	82	231.0	161.7
43	35.2	24.7	03	84.4	59.1	63	133.5	93.5	23	182.6	127.9	83	231.8	162.3
44	36.0	25.2	04	85.2	59.6	64	134.3	94.1	24	183.5	128.5	84	232.6	162.9
45	36.9	25.8	05	86.0	60.2	65	135.1	94.6	25	184.2	129.0	85	233.4	163.4
46	37.7	26.4	06	86.8	60.8	66	136.0	95.2	26	185.1	129.6	86	234.2	164.0
47	38.5	27.0	07	87.6	61.4	67	136.8	95.8	27	185.9	130.2	87	235.0	164.6
48	39.3	27.5	08	88.5	61.9	68	137.6	96.3	28	186.7	130.8	88	235.9	165.2
49	40.1	28.1	09	89.3	62.5	69	138.4	96.9	29	187.5	131.3	89	236.7	165.7
50	41.0	28.7	10	90.1	63.1	70	139.2	97.5	30	188.4	131.9	90	237.5	166.3
51	41.8	29.2	111	90.9	63.7	171	140.0	98.1	231	189.2	132.5	291	238.3	166.9
52	42.6	29.8	12	91.7	64.2	72	140.9	98.6	32	190.0	133.1	92	239.1	167.5
53	43.4	30.4	13	92.5	64.8	73	141.7	99.2	33	190.8	133.6	93	240.0	168.0
54	44.2	31.0	14	93.4	65.4	74	142.5	99.8	34	191.6	134.2	94	240.8	168.6
55	45.0	31.5	15	94.2	66.0	75	143.3	100.4	35	192.5	134.8	95	241.6	169.2
56	45.9	32.1	16	95.0	66.5	76	144.1	100.9	36	193.3	135.3	96	242.4	169.8
57	46.7	32.7	17	95.8	67.1	77	145.0	101.5	37	194.1	135.9	97	243.2	170.3
58	47.5	33.3	18	96.6	67.7	78	145.8	102.1	38	194.9	136.5	98	244.1	170.9
59	48.3	33.8	19	97.5	68.2	79	146.6	102.7	39	195.7	137.1	99	244.9	171.5
60	49.1	34.4	20	98.3	68.8	80	147.4	103.2	40	196.6	137.6	300	245.7	172.1
Diſt	Dep.	Lat.	Diſt	Dep.	Dep.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.

for 55 Degrees.

Difference of Latitude and Departure for 36 Degrees.

Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.
1	00.8	00.6	61	49.3	35.9	121	97.9	71.1	181	146.4	106.4	241	195.0	141.7
2	01.6	01.2	62	50.2	36.4	22	98.7	71.7	82	147.2	107.0	42	195.8	142.2
3	02.4	01.8	63	51.0	37.0	23	99.5	72.3	83	148.0	107.6	43	196.6	142.8
4	03.2	02.4	64	51.8	37.6	24	100.3	72.9	84	148.9	108.2	44	197.4	143.4
5	04.0	02.9	65	52.6	38.2	25	101.1	73.5	85	149.7	108.7	45	198.2	144.0
6	04.9	03.5	66	53.4	38.8	26	101.9	74.1	86	150.5	109.3	46	199.0	144.6
7	05.7	04.1	67	54.2	39.4	27	102.7	74.7	87	151.3	109.9	47	199.8	145.2
8	06.5	04.7	68	55.0	40.0	28	103.6	75.2	88	152.1	110.5	48	200.6	145.8
9	07.3	05.3	69	55.8	40.6	29	104.4	75.8	89	152.9	111.1	49	201.4	146.4
10	08.1	05.9	70	56.6	41.1	30	105.2	76.4	90	153.7	111.7	50	202.2	146.9
11	08.9	06.5	71	57.4	41.7	131	106.0	77.0	191	154.5	112.3	251	203.1	147.5
12	09.7	07.1	72	58.2	42.3	32	106.8	77.6	92	155.3	112.9	52	203.9	148.1
13	10.5	07.6	73	59.1	42.9	33	107.6	78.2	93	156.1	113.4	53	204.7	148.7
14	11.3	08.2	74	59.9	43.5	34	108.4	78.8	94	156.9	114.0	54	205.5	149.3
15	12.1	08.8	75	60.7	44.1	35	109.2	79.4	95	157.8	114.6	55	206.3	149.9
16	12.9	09.4	76	61.5	44.7	36	110.0	79.9	96	158.6	115.2	56	207.1	150.5
17	13.8	10.0	77	62.3	45.3	37	110.8	80.5	97	159.4	115.8	57	207.9	151.1
18	14.6	10.6	78	63.1	45.8	38	111.6	81.1	98	160.2	116.4	58	208.7	151.7
19	15.4	11.2	79	63.9	46.4	39	112.5	81.7	99	161.0	117.0	59	209.5	152.2
20	16.2	11.8	80	64.7	47.0	40	113.3	82.3	200	161.8	117.6	60	210.3	152.8
21	17.0	12.3	81	65.5	47.6	141	114.1	82.9	201	162.6	118.1	261	211.1	153.4
22	17.8	12.9	82	66.3	48.2	42	114.9	83.5	02	163.4	118.7	62	212.0	154.0
23	18.6	13.5	83	67.1	48.8	43	115.7	84.1	03	164.2	119.3	63	212.8	154.6
24	19.4	14.1	84	68.0	49.4	44	116.5	84.6	04	165.0	119.9	64	213.6	155.2
25	20.2	14.7	85	68.8	50.0	45	117.3	85.2	05	165.8	120.5	65	214.4	155.8
26	21.0	15.3	86	69.6	50.6	46	118.1	85.8	06	166.7	121.1	66	215.2	156.4
27	21.8	15.9	87	70.4	51.1	47	118.9	86.4	07	167.5	121.7	67	216.0	156.9
28	22.7	16.5	88	71.2	51.7	48	119.7	87.0	08	168.3	122.3	68	216.8	157.5
29	23.5	17.0	89	72.0	52.3	49	120.5	87.6	09	169.1	122.8	69	217.6	158.1
30	24.3	17.6	90	72.8	52.9	50	121.3	88.2	10	169.9	123.4	70	218.4	158.7
31	25.1	18.2	91	73.6	53.5	151	122.2	88.8	211	170.7	124.0	271	219.2	159.3
32	25.9	18.8	92	74.4	54.1	52	123.0	89.3	12	171.5	124.6	72	220.0	159.9
33	26.7	19.4	93	75.2	54.7	53	123.8	89.9	13	172.3	125.2	73	220.9	160.5
34	27.5	20.0	94	76.0	55.3	54	124.6	90.5	14	173.1	125.8	74	221.7	161.1
35	28.3	20.6	95	76.9	55.8	55	125.4	91.1	15	173.9	126.4	75	222.5	161.6
36	29.1	21.2	96	77.7	56.4	56	126.2	91.7	16	174.7	127.0	76	223.3	162.2
37	29.9	21.7	97	78.5	57.0	57	127.0	92.3	17	175.6	127.6	77	224.1	162.8
38	30.7	22.3	98	79.3	57.6	58	127.8	92.9	18	176.4	128.1	78	224.9	163.4
39	31.6	22.9	99	80.1	58.2	59	128.6	93.5	19	177.2	128.7	79	225.7	164.0
40	32.4	23.5	100	80.9	58.8	60	129.4	94.0	20	178.0	129.3	80	226.5	164.6
41	33.2	24.1	101	81.7	59.4	161	130.2	94.6	221	178.8	129.9	281	227.3	165.2
42	34.0	24.7	02	82.5	60.0	62	131.1	95.2	22	179.6	130.5	82	228.1	165.8
43	34.8	25.3	03	83.3	60.5	63	131.9	95.8	23	180.4	131.1	83	228.9	166.3
44	35.6	25.9	04	84.1	61.1	64	132.7	96.4	24	181.2	131.7	84	229.8	165.9
45	36.4	26.5	05	84.9	61.7	65	133.5	97.0	25	182.0	132.3	85	230.6	167.5
46	37.2	27.1	06	85.8	62.3	66	134.3	97.6	26	182.8	132.8	86	231.4	168.1
47	38.0	27.6	07	86.6	62.9	67	135.1	98.2	27	183.6	133.4	87	232.2	168.7
48	38.8	28.2	08	87.4	63.5	68	135.9	98.7	28	184.5	134.0	88	233.0	169.3
49	39.6	28.8	09	88.2	64.1	69	136.7	99.3	29	185.3	134.6	89	233.8	169.9
50	40.5	29.4	10	89.0	64.7	70	137.5	99.9	30	186.1	135.2	90	234.6	170.5
51	41.3	30.0	111	89.8	65.2	71	138.3	100.5	231	186.9	135.8	291	235.4	171.0
52	42.1	30.6	12	90.6	65.8	72	139.1	101.1	32	187.7	136.4	92	236.2	171.6
53	42.9	31.2	13	91.4	66.4	73	140.0	101.7	33	188.5	137.0	93	237.0	172.2
54	43.7	31.7	14	92.2	67.0	74	140.8	102.3	34	189.3	137.5	94	237.8	172.8
55	44.5	32.3	15	93.0	67.6	75	141.6	102.9	35	190.1	138.1	95	238.7	173.4
56	45.3	32.9	16	93.8	68.2	76	142.4	103.5	36	190.9	138.7	96	239.5	174.0
57	46.1	33.5	17	94.7	68.8	77	143.2	104.0	37	191.7	139.3	97	240.3	174.6
58	46.9	34.1	18	95.5	69.4	78	144.0	104.6	38	192.5	139.9	98	241.1	175.2
59	47.7	34.7	19	96.3	69.9	79	144.8	105.2	39	193.3	140.5	99	241.9	175.7
60	48.5	35.3	20	97.1	70.5	80	145.6	105.8	40	194.2	141.1	300	242.7	176.3
Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.

for 54 Degrees.

Difference of Latitude and Departure for 37 Degrees.

Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.
1	00.8	00.6	61	48.7	36.7	121	96.6	72.8	181	144.5	108.9	241	192.5	145.0
2	01.6	01.2	62	49.5	37.3	22	97.4	73.4	82	145.3	109.5	42	193.3	145.6
3	02.4	01.8	63	50.3	37.9	23	98.2	74.0	83	146.1	110.1	43	194.1	146.2
4	03.2	02.4	64	51.1	38.5	24	99.0	74.6	84	146.9	110.7	44	194.9	146.8
5	04.0	03.0	65	51.9	39.1	25	99.8	75.2	85	147.7	111.3	45	195.7	147.4
6	04.8	03.6	66	52.7	39.7	26	100.6	75.8	86	148.5	111.9	46	196.5	148.0
7	05.6	04.3	67	53.5	40.3	27	101.4	76.4	87	149.3	112.5	47	197.3	148.6
8	06.4	04.8	68	54.3	40.9	28	102.2	77.0	88	150.1	113.1	48	198.1	149.2
9	07.2	05.4	69	55.1	41.5	29	103.0	77.6	89	150.9	113.7	49	198.9	149.8
10	08.0	06.0	70	55.9	42.1	30	103.8	78.2	90	151.7	114.3	50	199.7	150.4
11	08.8	06.6	71	56.7	42.7	131	104.6	78.8	191	152.5	114.9	251	200.4	151.0
12	09.6	07.2	72	57.5	43.3	32	105.4	79.4	92	153.3	115.5	52	201.2	151.6
13	10.4	07.8	73	58.3	13.9	33	106.2	80.0	93	154.1	116.1	53	202.0	152.2
14	11.2	08.4	74	59.1	44.5	34	107.0	80.6	94	154.9	116.7	54	202.8	152.9
15	12.0	09.0	75	59.9	45.1	35	107.8	81.2	95	155.7	117.3	55	203.6	153.5
16	12.8	09.6	76	60.7	45.7	36	108.6	81.8	96	156.5	117.9	56	204.4	154.1
17	13.6	10.2	77	61.5	46.3	37	109.4	82.4	97	157.3	118.6	57	205.2	154.7
18	14.4	10.8	78	62.3	46.9	38	110.2	83.0	98	158.1	119.2	58	206.0	155.3
19	15.2	11.4	79	63.1	47.5	39	111.0	83.6	99	158.9	119.8	59	206.8	155.9
20	16.0	12.0	80	63.9	48.1	40	111.8	84.2	200	159.7	120.4	60	207.6	156.5
21	16.8	12.6	81	64.7	48.7	141	112.6	84.9	201	160.5	121.0	261	208.4	157.1
22	17.6	13.2	82	65.5	49.3	42	113.4	85.5	02	161.3	121.6	62	209.2	157.7
23	18.4	13.8	83	66.3	49.9	43	114.2	85.1	03	162.1	122.2	63	210.0	158.3
24	19.2	14.4	84	67.1	50.6	44	115.0	86.7	04	162.9	122.8	64	210.8	158.9
25	20.0	15.0	85	67.9	51.2	45	115.8	87.3	05	163.7	123.4	65	211.6	159.5
26	20.8	15.6	86	68.7	51.8	46	116.6	87.9	06	164.5	124.0	66	212.4	160.1
27	21.6	16.2	87	69.5	52.4	47	117.4	88.5	07	165.3	124.6	67	213.2	160.7
28	22.4	16.9	88	70.3	53.0	48	118.2	89.1	08	166.1	125.2	68	214.0	161.3
29	23.2	17.5	89	71.1	53.6	49	119.0	89.7	09	166.9	125.8	69	214.8	161.9
30	24.0	18.1	90	71.9	54.2	50	119.8	90.3	10	167.7	126.4	70	215.6	162.5
31	24.8	18.7	91	72.7	54.8	151	120.6	90.9	211	168.5	127.0	271	216.4	163.1
32	25.6	19.3	92	73.5	55.4	52	121.4	91.5	12	169.3	127.6	72	217.2	163.7
33	26.4	19.9	93	74.3	56.0	53	122.2	92.1	13	170.1	128.2	73	218.0	164.3
34	27.2	20.5	94	75.1	56.6	54	123.0	92.7	14	170.9	128.8	74	218.8	164.9
35	28.0	21.1	95	75.9	57.2	55	123.8	93.3	15	171.7	129.4	75	219.6	165.5
36	28.7	21.7	96	76.7	57.8	56	124.6	93.9	16	172.5	130.0	76	220.4	166.1
37	29.5	22.3	97	77.5	58.4	57	125.4	94.5	17	173.3	130.6	77	221.2	166.7
38	30.3	22.9	98	78.3	59.0	58	126.2	95.1	18	174.1	131.2	78	222.0	167.3
39	31.1	23.5	99	79.1	59.6	59	127.0	95.7	19	174.9	131.8	79	222.8	167.9
40	31.9	24.1	100	79.9	60.2	60	127.8	96.3	20	175.7	132.4	80	223.6	168.5
41	32.7	24.7	101	80.7	60.8	161	128.6	96.9	221	176.5	133.0	281	224.4	169.1
42	33.5	25.3	02	81.5	61.4	62	129.4	97.5	22	177.3	133.6	82	225.2	169.7
43	34.3	25.9	03	82.3	62.0	63	130.2	98.1	23	178.1	134.2	83	226.0	170.3
44	35.1	26.5	04	83.1	62.6	64	131.0	98.7	24	178.9	134.8	84	226.8	170.9
45	35.9	27.1	05	83.9	63.2	65	131.8	99.3	25	179.7	135.4	85	227.6	171.5
46	36.7	27.7	06	84.7	63.8	66	132.6	99.9	26	180.5	136.0	86	228.4	172.1
47	37.5	28.3	07	85.5	64.4	67	133.4	100.5	27	181.3	136.6	87	229.2	172.7
48	38.3	28.9	08	86.2	65.0	68	134.2	101.1	28	182.1	137.2	88	230.0	173.3
49	39.1	29.5	09	87.0	65.6	69	135.0	101.7	29	182.9	137.8	89	230.8	173.9
50	39.9	30.1	10	87.8	66.2	70	135.8	102.3	30	183.7	138.4	90	231.6	174.5
51	40.7	30.7	111	88.6	66.8	171	136.6	102.9	231	184.5	139.0	291	232.4	175.1
52	41.5	31.3	12	89.4	67.4	72	137.4	103.5	32	185.3	139.6	92	233.2	175.7
53	42.3	31.9	13	90.2	68.0	73	138.2	104.1	33	186.1	140.2	93	234.0	176.3
54	43.1	32.5	14	91.0	68.6	74	139.0	104.7	34	186.9	140.8	94	234.8	176.9
55	43.9	33.1	15	91.8	69.2	75	139.8	105.3	35	187.7	141.4	95	235.6	177.5
56	44.7	33.7	16	92.6	69.8	76	140.6	105.9	36	188.5	142.0	96	236.4	178.1
57	45.5	34.3	17	93.4	70.4	77	141.4	106.5	37	189.3	142.6	97	237.2	178.7
58	46.3	34.9	18	94.2	71.0	78	142.2	107.1	38	190.1	143.2	98	238.0	179.3
59	47.1	35.5	19	95.0	71.6	79	142.9	107.7	39	190.9	143.8	99	238.8	179.9
60	47.9	36.1	20	95.8	72.2	80	143.7	108.3	40	191.7	144.4	300	239.6	180.5
Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.

for 53 Degrees.

Difference of Latitude and Departure for 38 Degrees.

Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.
1	00.8	00.6	61	48.1	37.6	121	95.3	74.5	181	142.6	111.4	241	189.9	148.4
2	01.6	01.2	62	48.9	38.2	22	96.1	75.1	82	143.4	112.1	42	190.7	149.0
3	02.4	01.8	63	49.6	38.8	23	96.9	75.7	83	144.2	112.7	43	191.5	149.6
4	03.2	02.5	64	50.4	39.4	24	97.7	76.3	84	145.0	113.3	44	192.2	150.2
5	03.9	03.1	65	51.2	40.0	25	98.5	77.0	85	145.8	113.9	45	193.0	150.8
6	04.7	03.7	66	52.0	40.6	26	99.3	77.6	86	146.5	114.5	46	193.8	151.5
7	05.5	04.3	67	52.8	41.3	27	100.1	78.2	87	147.3	115.1	47	194.6	152.1
8	06.3	04.9	68	53.6	41.9	28	100.9	78.8	88	148.1	115.8	48	195.4	152.7
9	07.1	05.5	69	54.4	42.5	29	101.6	79.4	89	148.9	116.4	49	196.2	153.3
10	07.9	06.2	70	55.2	43.1	30	102.4	80.0	90	149.7	117.0	50	197.0	153.9
11	08.7	06.8	71	55.9	43.7	31	103.2	80.7	191	150.5	117.6	251	197.8	154.5
12	09.5	07.4	72	56.7	44.3	32	104.0	81.3	92	151.3	118.2	52	198.5	155.2
13	10.2	08.0	73	57.5	44.9	33	104.8	81.9	93	152.1	118.8	53	199.3	155.8
14	11.0	08.6	74	58.3	45.6	34	105.6	82.5	94	152.9	119.4	54	200.1	156.4
15	11.8	09.2	75	59.1	46.2	35	106.4	83.1	95	153.6	120.1	55	200.9	157.0
16	12.6	09.9	76	59.9	46.8	36	107.2	83.7	96	154.4	120.7	56	201.7	157.6
17	13.4	10.5	77	60.7	47.4	37	107.9	84.4	97	155.2	121.3	57	202.5	158.2
18	14.2	11.1	78	61.5	48.0	38	108.7	85.0	98	156.0	121.9	58	203.3	158.9
19	15.0	11.7	79	62.2	48.6	39	109.5	85.6	99	156.8	122.5	59	204.1	159.5
20	15.8	12.3	80	63.0	49.3	40	110.3	86.2	200	157.6	123.1	60	204.9	160.1
21	16.5	12.9	81	63.8	49.9	141	111.1	86.8	201	158.4	123.8	261	205.6	160.7
22	17.3	13.5	82	64.6	50.5	42	111.9	87.4	02	159.2	124.4	62	206.4	161.3
23	18.1	14.2	83	65.4	51.1	43	112.7	88.0	03	159.9	125.0	63	207.2	161.9
24	18.9	14.8	84	66.2	51.7	44	113.5	88.7	04	160.7	125.6	64	208.0	162.5
25	19.7	15.4	85	67.0	52.3	45	114.2	89.3	05	161.5	126.2	65	208.8	163.2
26	20.5	16.0	86	67.8	53.0	46	115.0	89.9	06	162.3	126.8	66	209.6	163.8
27	21.3	16.6	87	68.5	53.6	47	115.8	99.5	07	163.1	127.4	67	210.4	164.4
28	22.1	17.2	88	69.3	54.2	48	116.6	91.1	08	163.9	128.1	68	211.2	165.0
29	22.9	17.9	89	70.1	54.8	49	117.4	91.7	09	164.7	128.7	69	211.9	165.6
30	23.6	18.5	90	70.9	55.4	50	118.2	92.4	10	165.5	129.3	70	212.7	166.2
31	24.4	19.1	91	71.7	56.0	151	119.0	93.0	211	166.2	129.9	271	213.5	166.9
32	25.2	19.7	92	72.5	56.6	52	119.8	93.6	12	167.0	130.5	72	214.3	167.5
33	26.0	20.3	93	73.3	57.3	53	120.5	94.2	13	167.8	131.1	73	215.1	168.1
34	26.8	20.9	94	74.1	57.9	54	121.3	94.8	14	168.6	131.8	74	215.9	168.7
35	27.6	21.5	95	74.9	58.5	55	122.1	95.4	15	169.4	132.4	75	216.7	169.3
36	28.4	22.2	96	75.6	59.1	56	122.9	96.0	16	170.2	133.0	76	217.5	169.9
37	29.2	22.8	97	76.4	59.7	57	123.7	96.7	17	171.0	133.6	77	218.2	170.5
38	29.9	23.4	98	77.2	60.3	58	124.5	97.3	18	171.8	134.2	78	219.0	171.2
39	30.7	24.0	99	78.0	61.0	59	125.3	97.9	19	172.5	134.8	79	219.8	171.8
40	31.5	24.6	100	78.8	61.6	60	120.1	98.5	20	173.3	135.5	80	220.6	172.4
41	32.3	25.2	101	79.6	62.2	161	126.9	99.1	221	174.1	136.1	281	221.4	173.0
42	33.1	25.9	02	80.4	62.8	62	127.6	99.7	22	174.9	136.7	82	222.2	173.6
43	33.9	26.5	03	81.2	63.4	63	128.4	100.4	23	175.7	137.3	83	223.0	174.2
44	34.7	27.1	04	81.9	64.0	64	129.2	101.0	24	176.5	137.9	84	223.8	174.9
45	35.5	27.7	05	82.7	64.6	65	130.0	101.6	25	177.3	138.5	85	224.5	175.5
46	36.2	28.3	06	83.5	65.3	66	130.8	102.2	26	178.1	139.1	86	225.3	176.1
47	37.0	28.9	07	84.3	65.9	67	131.6	102.8	27	178.9	139.8	87	226.1	176.7
48	37.8	29.6	08	85.1	66.5	68	132.4	103.4	28	179.6	140.4	88	226.9	177.3
49	38.6	30.2	09	85.9	67.1	69	133.2	104.1	29	180.4	141.0	89	227.7	177.9
50	39.4	30.8	10	86.7	67.7	70	133.9	104.7	30	181.2	141.6	90	228.5	178.6
51	40.2	31.4	111	87.5	68.3	171	134.7	105.3	231	182.0	142.2	291	229.3	179.2
52	41.0	32.0	12	88.2	69.0	72	135.5	105.9	32	182.8	142.8	92	230.1	179.8
53	41.8	32.6	13	89.0	69.6	73	136.3	106.5	33	183.6	143.5	93	230.9	180.4
54	42.5	33.2	14	89.8	70.2	74	137.1	107.1	34	184.4	144.1	94	231.6	181.0
55	43.3	33.9	15	90.6	70.8	75	137.9	107.7	35	185.2	144.7	95	232.4	181.6
56	44.1	34.5	16	91.4	71.4	76	138.7	108.4	36	185.9	145.3	96	233.2	182.2
57	44.9	35.1	17	92.2	72.0	77	139.5	109.0	37	186.7	145.9	97	234.0	182.9
58	45.7	35.7	18	93.0	72.7	78	140.2	109.6	38	187.5	146.5	98	234.8	183.5
59	46.5	36.3	19	93.8	73.3	79	141.0	110.2	39	188.3	147.2	99	235.6	184.1
60	47.3	36.9	20	94.5	73.9	80	141.8	110.8	40	189.1	147.8	300	236.4	184.7
Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.

for 52 Degrees.

Difference of Latitude and Departure for 39 Degrees.

Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.
1	00.8	00.6	61	47.4	38.4	121	94.0	76.1	181	140.7	113.9	241	187.3	151.7
2	01.6	01.3	62	48.2	39.0	22	94.8	76.8	82	141.4	114.5	42	188.1	152.3
3	02.3	01.9	63	49.0	39.6	23	95.6	77.4	83	142.2	115.2	43	188.8	152.9
4	03.1	02.5	64	49.7	40.3	24	96.4	78.0	84	143.0	115.8	44	189.6	153.6
5	03.9	03.1	65	50.5	40.9	25	97.1	78.7	85	143.8	116.4	45	190.4	154.2
6	04.7	03.8	66	51.3	41.5	26	97.9	79.3	86	144.5	117.1	46	191.2	154.8
7	05.4	04.4	67	52.1	42.2	27	98.7	79.9	87	145.3	117.7	47	191.9	155.4
8	06.2	05.0	68	52.8	42.8	28	99.5	80.6	88	146.1	118.3	48	192.7	156.1
9	07.0	05.7	69	53.6	43.4	29	100.2	81.2	89	146.9	118.9	49	193.5	156.7
10	07.8	06.3	70	54.4	44.1	30	101.0	81.8	90	147.6	119.6	50	194.3	157.3
11	08.5	06.9	71	55.2	44.7	131	101.8	82.4	191	148.4	120.2	251	195.1	158.0
12	09.3	07.6	72	56.0	45.3	32	102.6	83.1	92	149.2	120.8	52	195.8	158.6
13	10.1	08.2	73	56.7	45.9	33	103.4	83.7	93	150.0	121.5	53	196.6	159.2
14	10.9	08.8	74	57.5	46.6	34	104.1	84.3	94	150.8	122.1	54	197.4	159.8
15	11.7	09.4	75	58.3	47.2	35	104.9	85.0	95	151.5	122.7	55	198.2	160.5
16	12.4	10.1	76	59.1	47.8	36	105.7	85.6	96	152.3	123.3	56	198.9	161.1
17	13.2	10.7	77	59.8	48.5	37	106.5	86.2	97	153.1	124.0	57	199.7	161.7
18	14.0	11.3	78	60.6	49.1	38	107.2	86.8	98	153.9	124.6	58	200.5	162.4
19	14.8	12.0	79	61.4	49.7	39	108.0	87.5	99	154.6	125.2	59	201.3	163.0
20	15.5	12.6	80	62.2	50.3	40	108.8	88.1	200	155.4	125.9	60	202.0	163.6
21	16.3	13.2	81	62.9	51.0	141	109.6	88.7	201	156.2	126.5	261	202.8	164.2
22	17.1	13.8	82	63.7	51.6	42	110.3	89.4	02	157.0	127.1	62	203.6	164.9
23	17.9	14.5	83	64.5	52.2	43	111.1	90.0	03	157.8	127.7	63	204.4	165.5
24	18.7	15.1	84	65.3	52.9	44	111.9	90.6	04	158.5	128.4	64	205.2	166.1
25	19.4	15.7	85	66.1	53.5	45	112.7	91.2	05	159.3	129.0	65	205.9	166.8
26	20.2	16.4	86	66.8	54.1	46	113.5	91.9	06	160.1	129.6	66	206.7	167.4
27	21.0	17.0	87	67.6	54.7	47	114.2	92.5	07	160.9	130.3	67	207.5	168.0
28	21.8	17.6	88	68.4	55.4	48	115.0	93.1	08	161.6	130.9	68	208.3	168.7
29	22.5	18.2	89	69.2	56.0	49	115.8	93.8	09	162.4	131.5	69	209.0	169.3
30	23.3	18.9	90	69.9	56.6	50	116.6	94.4	10	163.2	132.2	70	209.8	169.9
31	24.1	19.5	91	70.7	57.3	151	117.3	95.0	211	164.0	132.8	271	210.6	170.5
32	24.9	20.1	92	71.5	57.9	52	118.1	95.7	12	164.7	133.4	72	211.4	171.2
33	25.6	20.8	93	72.5	58.5	53	118.9	96.3	13	165.5	134.0	73	212.1	171.8
34	26.4	21.4	94	73.0	59.2	54	119.7	96.9	14	166.3	134.7	74	212.9	172.4
35	27.2	22.0	95	73.8	59.8	55	120.5	97.5	15	167.1	135.3	75	213.7	173.1
36	28.0	22.7	96	74.6	60.4	56	121.2	98.2	16	167.9	135.9	76	214.5	173.7
37	28.8	23.3	97	75.4	60.9	57	122.0	98.8	17	168.6	136.6	77	215.3	174.3
38	29.5	23.9	98	76.2	61.7	58	122.8	99.4	18	169.4	137.2	78	216.0	174.9
39	30.3	24.5	99	76.9	62.3	59	123.6	100.1	19	170.2	137.8	79	216.8	175.6
40	31.1	25.2	100	77.7	62.9	60	124.3	100.7	20	171.0	138.4	80	217.6	176.2
41	31.9	25.8	101	78.5	63.6	161	125.1	101.3	221	171.7	139.1	281	218.4	176.8
42	32.6	26.4	02	79.3	64.2	62	125.9	101.9	22	172.5	139.7	82	219.1	177.5
43	33.4	27.1	03	80.0	64.8	63	126.7	102.6	23	173.3	140.3	83	219.9	178.1
44	34.2	27.7	04	80.8	65.4	64	127.4	103.2	24	174.1	141.0	84	220.7	178.7
45	35.0	28.3	05	81.6	66.1	65	128.2	103.8	25	174.8	141.6	85	221.5	179.4
46	35.7	28.9	06	82.4	66.7	66	129.0	104.5	26	175.6	142.2	86	222.3	180.0
47	36.5	29.6	07	83.1	67.3	67	129.8	105.1	27	176.4	142.9	87	228.0	180.6
48	37.3	30.2	08	83.9	68.0	68	130.6	105.7	28	177.2	143.5	88	223.8	181.2
49	38.1	30.8	09	84.7	68.6	69	131.3	106.4	29	178.0	144.1	89	224.6	181.9
50	38.9	31.5	10	85.5	69.2	70	132.1	107.0	30	178.7	144.7	90	225.4	182.5
51	39.6	32.1	111	86.3	69.9	171	132.9	107.6	231	179.5	145.4	291	226.1	183.1
52	40.4	32.7	12	87.0	70.5	72	133.7	108.2	32	180.3	146.0	92	226.9	183.8
53	41.2	33.4	13	87.8	71.1	73	134.4	108.9	33	181.1	146.6	93	227.7	184.4
54	42.0	34.0	14	88.6	71.7	74	135.2	109.5	34	181.8	147.3	94	228.5	185.0
55	42.7	34.6	15	89.4	72.4	75	136.0	110.1	35	182.6	147.9	95	129.2	185.6
56	43.5	35.2	16	90.1	73.0	76	136.8	110.8	36	183.4	148.5	96	230.0	186.3
57	44.3	35.9	17	90.9	73.6	77	137.5	111.4	37	184.2	149.1	97	230.8	186.9
58	45.1	36.5	18	91.7	74.3	78	138.3	112.0	38	185.0	149.8	98	231.6	187.5
59	45.8	37.1	19	92.5	74.9	79	139.1	112.6	39	185.7	150.4	99	232.4	188.2
60	46.6	37.8	20	93.3	75.5	80	139.9	113.3	40	186.5	151.0	300	233.1	188.8
Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.

for 51 Degrees.

Difference of Latitude and Departure for 40 Degrees.

Diſt	Lat	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep	Diſt	Lat.	Dep.
1	00.8	00.6	61	46.7	39.2	121	92.7	77.8	181	138.6	116.4	241	184.6	154.9
2	01.5	01.3	62	47.5	39.9	22	93.4	78.4	82	139.4	117.0	42	185.4	155.6
3	02.3	01.9	63	48.3	40.5	23	94.2	79.1	83	140.2	117.7	43	186.1	156.2
4	03.1	02.6	64	49.0	41.1	24	95.0	79.7	84	140.9	118.3	44	186.9	156.9
5	03.8	03.2	65	49.8	41.8	25	95.7	80.4	85	141.7	118.9	45	187.7	157.5
6	04.6	03.9	66	50.6	42.4	26	96.5	81.0	86	142.5	119.6	46	188.4	158.1
7	05.4	04.5	67	51.3	43.1	27	97.3	81.6	87	143.2	120.2	47	189.2	158.8
8	06.1	05.1	68	52.1	43.7	28	98.0	82.3	88	144.0	120.9	48	190.0	159.4
9	06.9	05.8	69	52.9	44.4	29	98.8	82.9	89	144.8	121.5	49	190.7	160.1
10	07.7	06.4	70	53.6	45.0	30	99.6	83.6	90	145.5	122.1	50	191.5	160.7
11	08.4	07.1	71	54.4	45.6	131	100.3	84.2	191	146.3	122.8	251	192.3	161.4
12	09.2	07.7	72	55.2	46.3	32	101.1	84.9	92	147.1	123.4	52	193.0	162.0
13	10.0	08.4	73	55.9	46.9	33	101.9	85.5	93	147.8	124.1	53	193.8	162.6
14	10.7	09.0	74	56.7	47.6	34	102.6	86.1	94	148.6	124.7	54	194.6	163.3
15	11.5	09.6	75	57.4	48.2	35	103.4	86.8	95	149.4	125.4	55	195.3	163.9
16	12.3	10.3	76	58.2	48.9	36	104.2	87.4	96	150.1	126.0	56	196.1	164.6
17	13.0	10.9	77	59.0	49.5	37	104.9	88.1	97	150.9	126.6	57	196.9	165.2
18	13.8	11.6	78	59.7	50.1	38	105.7	88.7	98	151.7	127.3	58	197.6	165.9
19	14.6	12.2	79	60.5	50.8	39	106.5	89.4	99	152.4	127.9	59	198.4	166.5
20	15.3	12.9	80	61.3	51.4	40	107.2	90.0	200	153.2	128.6	60	199.2	167.1
21	16.1	13.5	81	62.0	52.1	141	108.0	90.6	201	154.0	129.2	261	199.9	167.8
22	16.9	14.1	82	62.8	52.7	42	108.8	91.3	02	154.7	129.9	62	200.7	168.4
23	17.6	14.8	83	63.6	53.4	43	109.5	91.9	03	155.5	130.5	63	201.4	169.1
24	18.4	15.4	84	64.3	54.0	44	110.3	92.6	04	156.3	131.1	64	202.2	169.7
25	19.2	16.1	85	65.1	54.6	45	111.1	93.2	05	157.0	131.8	65	203.0	170.4
26	19.9	16.7	86	65.9	55.3	46	111.8	93.9	06	157.8	132.4	66	203.7	171.0
27	20.7	17.4	87	66.6	55.9	47	112.6	94.5	07	158.6	133.1	67	204.5	171.6
28	21.4	18.0	88	67.4	56.6	48	113.4	95.1	08	159.3	133.7	68	205.3	172.3
29	22.2	18.6	89	68.2	57.2	49	114.6	95.8	09	160.1	134.4	69	206.0	172.9
30	23.0	19.3	90	68.9	57.9	50	114.9	96.4	10	160.9	135.0	70	206.8	173.6
31	23.7	19.9	91	69.7	58.5	151	115.7	97.1	211	161.6	135.6	271	207.6	174.2
32	24.5	20.6	92	70.5	59.1	52	116.4	97.7	12	162.4	136.3	72	208.3	174.8
33	25.3	21.2	93	71.2	59.8	53	117.2	98.4	13	163.2	136.9	73	209.1	175.5
34	26.0	21.9	94	72.0	60.4	54	118.0	99.0	14	163.9	137.6	74	209.9	176.1
35	26.8	22.5	95	72.8	61.1	55	118.7	99.6	15	164.7	138.2	75	210.6	176.8
36	27.6	23.1	96	73.5	61.7	56	119.5	100.3	16	165.4	138.8	76	211.4	177.4
37	28.3	23.8	97	74.3	62.4	57	120.3	100.9	17	166.2	139.5	77	212.2	178.1
38	29.1	24.4	98	75.1	63.0	58	121.0	101.6	18	167.0	140.1	78	212.9	178.7
39	29.9	25.1	99	75.8	63.6	59	121.8	102.2	19	167.7	140.8	79	213.7	179.3
40	30.6	25.7	100	76.6	64.3	60	122.6	102.8	20	168.5	141.4	80	214.5	180.0
41	31.4	26.4	101	77.4	64.9	161	123.3	103.5	221	169.3	142.1	281	215.2	180.6
42	32.2	27.0	02	78.1	65.6	62	124.1	104.1	22	170.0	142.7	82	216.0	181.3
43	32.9	27.6	03	78.9	66.2	63	124.9	104.8	23	170.8	143.3	83	216.8	181.9
44	33.7	28.3	04	79.7	66.8	64	125.6	105.4	24	171.6	144.0	84	217.5	182.6
45	34.5	28.9	05	80.4	67.5	65	126.4	106.1	25	172.3	144.6	85	218.3	183.2
46	35.2	29.6	06	81.2	68.1	66	127.2	106.7	26	173.1	145.3	86	219.1	183.9
47	36.0	30.2	07	82.0	68.8	67	127.9	107.3	27	173.9	145.9	87	219.8	184.5
48	36.8	30.8	08	82.7	69.4	68	128.7	108.0	28	174.6	146.6	88	220.6	185.1
49	37.5	31.5	09	83.5	70.1	69	129.4	108.6	29	175.4	147.2	89	221.4	185.8
50	38.3	32.1	10	84.3	70.7	70	130.2	109.3	30	176.2	147.9	90	222.5	186.4
51	39.1	32.8	111	85.0	71.3	171	131.0	109.9	231	176.9	148.5	291	222.9	187.1
52	39.8	33.4	12	85.8	72.0	72	131.7	110.6	32	177.7	149.1	92	223.7	187.7
53	40.6	34.1	13	86.6	72.6	73	132.5	111.2	33	178.5	149.8	93	224.4	188.4
54	41.4	34.7	14	87.3	73.3	74	133.3	111.9	34	179.2	150.4	94	225.2	189.0
55	42.1	35.3	15	88.1	73.9	75	134.0	112.5	35	180.0	151.1	95	226.0	189.6
56	42.9	36.0	16	88.9	74.6	76	134.8	113.1	36	180.8	151.7	96	226.7	190.3
57	43.7	36.6	17	89.6	75.2	77	135.6	113.8	37	181.5	152.4	97	227.5	190.9
58	44.4	37.3	18	90.4	75.9	78	136.3	114.4	38	182.3	153.0	98	228.3	191.6
59	45.2	37.6	19	91.2	76.5	79	137.1	115.1	39	183.1	153.6	99	229.0	192.2
60	46.0	38.6	20	91.9	77.1	80	137.9	115.7	40	183.8	154.3	300	229.8	192.9
Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.

for 50 Degrees.

Difference of Latitude and Departure for 41 Degrees.

Dift	Lat.	Dep.	Dift	Lat.	Dep.	Dift	Lat.	Dep.	Dift	Lat.	Dep.	Dift	Lat.	Dep.
1	00.8	00.7	61	46.0	40.0	121	91.3	79.4	181	136.6	118.7	241	181.9	158.1
2	01.5	01.3	62	46.8	40.7	22	92.1	80.0	82	137.4	119.4	42	182.6	158.7
3	02.3	02.0	63	47.5	41.3	23	92.8	80.7	83	138.1	120.0	43	183.4	159.4
4	03.0	02.6	64	48.3	42.0	24	93.6	81.3	84	138.9	120.7	44	184.2	160.0
5	03.8	03.3	65	49.1	42.6	25	94.3	82.0	85	139.6	121.4	45	184.9	160.7
6	04.5	03.9	66	49.8	43.3	26	95.1	82.6	86	140.4	122.0	46	185.7	161.4
7	05.3	04.6	67	50.6	44.0	27	95.8	83.3	87	141.1	122.7	47	186.4	162.0
8	06.0	05.2	68	51.3	44.6	28	96.6	84.0	88	141.9	123.3	48	187.2	162.7
9	06.8	05.9	69	52.1	45.3	29	97.4	84.6	89	142.6	124.0	49	187.9	163.3
10	07.5	06.6	70	52.8	45.9	30	98.1	85.3	90	143.4	124.6	50	188.7	164.0
11	08.3	07.2	71	53.6	46.6	131	98.9	85.9	191	144.2	125.3	251	189.4	164.6
12	09.1	07.9	72	54.3	47.2	32	99.6	86.6	92	144.9	125.9	52	190.2	165.3
13	09.8	08.5	73	55.1	47.9	33	100.4	87.2	93	145.7	126.6	53	190.9	166.0
14	10.6	09.2	74	55.8	48.5	34	101.1	87.9	94	146.4	127.3	54	191.7	166.6
15	11.3	09.8	75	56.6	49.2	35	101.9	88.6	95	147.2	127.9	55	192.5	167.3
16	12.1	10.5	76	57.4	49.9	36	102.6	89.2	96	147.9	128.6	56	193.2	167.9
17	12.8	11.2	77	58.1	50.5	37	103.4	89.9	97	148.7	129.2	57	194.0	168.6
18	13.6	11.8	78	58.9	51.2	38	104.2	90.5	98	149.4	129.9	58	194.7	169.2
19	14.3	12.5	79	59.6	51.8	39	104.9	91.2	99	150.2	130.5	59	195.5	169.9
20	15.1	13.1	80	60.4	52.5	40	105.7	91.8	200	150.9	131.2	60	196.2	170.5
21	15.8	13.8	81	61.1	53.1	141	106.4	92.5	201	151.7	131.8	261	197.0	171.2
22	16.6	14.4	82	61.9	53.8	42	107.2	93.1	02	152.5	132.5	62	197.7	171.9
23	17.4	15.1	83	62.6	54.4	43	107.9	93.8	03	153.2	133.2	63	198.5	172.5
24	18.1	15.7	84	63.4	55.1	44	108.7	94.5	04	154.0	133.8	64	199.2	173.2
25	18.9	16.4	85	64.2	55.8	45	109.4	95.1	05	154.7	134.5	65	200.0	173.8
26	19.6	17.1	86	64.9	56.4	46	110.2	95.8	06	155.5	135.1	66	200.8	174.5
27	20.4	17.7	87	65.7	57.1	47	110.9	96.4	07	156.2	135.8	67	201.5	175.1
28	21.1	18.4	88	66.4	57.7	48	111.7	97.1	08	157.0	136.4	68	202.3	175.8
29	21.9	19.0	89	67.2	58.4	49	112.5	97.7	09	157.7	137.1	69	203.0	176.4
30	22.6	19.7	90	67.9	59.0	50	113.2	98.4	10	158.5	137.7	70	203.8	177.1
31	23.4	20.3	91	68.7	59.7	151	114.0	99.0	211	159.2	138.4	271	204.5	177.8
32	24.2	21.0	92	69.4	60.4	52	114.7	99.7	12	160.0	139.1	72	205.3	178.4
33	24.9	21.6	93	70.2	61.0	53	115.5	100.4	13	160.8	139.7	73	206.0	179.1
34	25.7	22.3	94	70.9	61.7	54	116.2	101.0	14	161.5	140.4	74	206.8	179.7
35	26.4	23.0	95	71.7	62.3	55	117.0	101.7	15	162.3	141.0	75	207.5	180.4
36	27.2	23.6	96	72.5	63.0	56	117.7	102.3	16	163.0	141.7	76	208.3	181.0
37	27.9	24.3	97	73.2	63.6	57	118.5	103.0	17	163.6	142.3	77	209.1	181.7
38	28.7	24.9	98	74.0	64.3	58	119.2	103.6	18	164.5	143.0	78	209.8	182.4
39	29.4	25.6	99	74.7	64.9	59	120.0	104.3	19	165.3	143.6	79	210.6	183.0
40	30.2	26.2	100	75.5	65.6	60	120.8	105.0	20	166.0	144.3	80	211.3	183.7
41	30.9	26.9	101	76.2	66.3	161	121.5	105.6	221	166.8	145.0	281	212.1	184.3
42	31.7	27.6	02	77.0	66.9	62	122.3	106.3	22	167.5	145.6	82	212.8	185.0
43	32.5	28.2	03	77.7	67.6	63	123.0	106.9	23	168.3	146.3	83	213.6	185.6
44	33.2	28.9	04	78.5	68.2	64	123.8	107.6	24	169.1	146.9	84	214.3	186.3
45	34.0	29.5	05	79.2	68.9	65	124.5	108.2	25	169.8	147.6	85	215.1	186.9
46	34.7	30.2	06	80.0	69.5	66	125.3	108.9	26	170.6	148.2	86	215.8	187.6
47	35.5	30.8	07	80.8	70.2	67	126.0	109.5	27	171.3	148.9	87	216.6	188.3
48	36.2	31.5	08	81.5	70.8	68	126.8	110.2	28	172.1	149.6	88	217.4	188.9
49	37.0	32.1	09	82.3	71.5	69	127.5	110.9	29	172.8	150.2	89	218.1	189.6
50	37.7	32.8	10	83.0	72.2	70	128.3	111.5	30	173.6	150.9	90	218.9	190.3
51	38.5	33.5	111	83.8	72.8	171	129.1	112.2	231	174.3	151.5	291	219.6	190.9
52	39.2	34.1	12	84.5	73.5	72	129.8	112.8	32	175.1	152.2	92	220.4	191.5
53	40.0	34.8	13	85.3	74.1	73	130.6	113.5	33	175.8	152.8	93	221.1	192.2
54	40.8	35.4	14	86.0	74.8	74	131.3	114.1	34	176.6	153.5	94	221.9	192.8
55	41.5	36.1	15	86.8	75.4	75	132.1	114.8	35	177.4	154.1	95	222.6	193.5
56	42.3	36.7	16	87.5	76.1	76	132.8	115.4	36	178.1	154.8	96	223.4	194.2
57	43.0	37.4	17	88.3	76.7	77	133.6	116.1	37	178.9	155.5	97	224.2	194.8
58	43.8	38.0	18	89.1	77.4	78	134.3	116.8	38	179.6	156.1	98	224.9	195.5
59	44.5	38.7	19	89.8	78.1	79	135.1	117.4	39	180.4	156.8	99	225.7	196.1
60	45.3	39.4	20	90.6	78.7	80	135.8	118.1	40	181.1	157.4	300	226.4	196.8
Dift	Dep.	Lat.	Dift	Dep.	Lat.	Dift	Dep.	Lat.	Dift	Dep.	Lat.	Dift	Dep.	Lat.

for 49 Degrees.

Difference of Latitude and Departure for 42 Degrees.

Dist	Lat	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.
1	00.7	00.7	61	45.3	40.8	121	89.9	80.9	181	134.5	121.1	241	179.0	161.2
2	01.5	01.3	62	46.1	41.5	22	90.6	81.6	82	135.2	121.8	42	179.8	161.9
3	02.2	02.0	63	46.8	42.1	23	91.4	82.3	83	135.9	122.4	43	180.5	162.6
4	03.0	02.7	64	47.5	42.8	24	92.1	83.0	84	136.7	123.1	44	181.3	163.2
5	03.7	03.3	65	48.3	43.5	25	92.9	83.6	85	137.3	123.8	45	182.0	163.9
6	04.5	04.0	66	49.0	44.2	26	93.6	84.3	86	138.2	124.4	46	182.7	164.6
7	05.2	04.7	67	49.8	44.8	27	94.3	85.0	87	138.9	125.1	47	183.5	165.2
8	05.9	05.4	68	50.5	45.5	28	95.1	85.6	88	139.7	125.8	48	184.2	165.9
9	06.7	06.0	69	51.3	46.2	29	95.8	86.3	89	140.4	126.4	49	185.0	166.6
10	07.4	06.7	70	52.0	46.8	30	96.6	87.0	90	141.1	127.1	50	185.7	167.2
11	08.2	07.4	71	52.7	47.5	131	97.3	87.6	191	141.9	127.8	251	186.5	167.9
12	08.9	08.0	72	53.5	48.2	32	98.1	88.3	92	142.6	128.4	52	187.2	168.6
13	09.7	08.7	73	54.2	48.8	33	98.8	89.0	93	143.4	129.1	53	187.9	169.3
14	10.4	09.4	74	55.0	49.5	34	99.5	89.6	94	145.1	129.8	54	188.7	169.9
15	11.1	10.0	75	55.7	50.2	35	100.3	90.3	95	144.9	130.5	55	189.4	170.6
16	11.9	10.7	76	56.5	50.8	36	101.0	91.0	96	145.6	131.1	56	190.2	171.3
17	12.6	11.4	77	57.2	51.5	37	101.8	91.7	97	146.3	131.8	57	190.9	171.9
18	13.4	12.0	78	57.9	52.2	38	102.5	92.3	98	147.1	132.5	58	191.7	172.6
19	14.1	12.7	79	58.7	52.9	39	103.3	93.0	99	147.8	133.1	59	192.4	173.3
20	14.9	13.4	80	59.4	53.5	40	104.0	93.7	200	148.6	133.8	60	193.1	173.9
21	15.6	14.0	81	60.2	54.2	141	104.7	94.3	201	149.3	134.5	261	193.9	174.6
22	16.3	14.7	82	60.9	54.9	42	105.5	95.0	02	150.1	135.1	62	194.6	175.3
23	17.1	15.4	83	61.7	55.5	43	106.2	95.7	03	150.8	135.8	63	195.4	175.9
24	17.8	16.1	84	62.4	56.2	44	107.0	96.3	04	151.5	136.5	64	196.1	176.6
25	18.6	16.7	85	63.1	56.9	45	107.7	97.0	05	152.3	137.1	65	196.9	177.3
26	19.3	17.4	86	63.9	57.5	46	108.5	97.7	06	153.0	137.8	66	197.6	177.9
27	20.1	18.1	87	64.6	58.2	47	109.2	98.3	07	153.8	138.5	67	198.3	178.6
28	20.8	18.7	88	65.4	58.9	48	109.9	99.0	08	154.5	139.1	68	199.1	179.3
29	21.5	19.4	89	66.1	59.5	49	110.7	99.7	09	155.3	139.8	69	199.8	180.0
30	22.3	20.1	90	66.9	60.2	50	111.4	100.4	10	156.0	140.5	70	200.6	180.6
31	23.0	20.7	91	67.6	60.9	151	112.2	101.0	211	156.7	141.2	271	201.3	181.3
32	23.8	21.4	92	68.3	61.5	52	112.9	101.7	12	157.5	141.8	72	202.1	182.0
33	24.5	22.1	93	69.1	62.2	53	113.7	102.4	13	158.2	142.5	73	202.8	182.6
34	25.3	22.7	94	69.8	62.9	54	114.4	103.0	14	159.0	143.2	74	203.5	183.3
35	26.0	23.4	95	70.6	63.6	55	115.1	103.7	15	159.7	143.8	75	204.3	184.0
36	26.7	24.1	96	71.3	64.2	56	115.9	104.4	16	160.5	144.5	76	205.0	184.6
37	27.5	24.8	97	72.1	64.9	57	116.6	105.0	17	161.2	145.2	77	205.8	185.3
38	28.2	25.4	98	72.8	65.6	58	117.4	105.7	18	161.9	145.8	78	206.5	186.0
39	29.0	26.1	99	73.5	66.2	59	118.1	106.4	19	162.7	146.5	79	207.3	186.6
40	29.7	26.8	100	74.3	66.9	60	118.9	107.0	20	163.4	147.2	80	208.0	187.3
41	30.5	27.4	101	75.0	67.6	161	119.6	107.7	221	164.2	147.8	281	208.7	188.0
42	31.2	28.1	02	75.8	68.2	62	120.3	108.4	22	164.9	148.5	82	209.5	188.7
43	31.9	28.8	03	76.5	68.9	63	121.1	109.0	23	165.7	149.2	83	210.2	189.3
44	32.7	29.4	04	77.3	69.6	64	121.8	109.7	24	166.4	149.9	84	211.0	190.0
45	33.4	30.1	05	78.0	70.2	65	122.6	110.4	25	167.1	150.5	85	211.7	190.7
46	34.2	30.8	06	78.7	70.9	66	123.3	111.0	26	167.9	151.2	86	212.5	191.3
47	34.9	31.4	07	79.5	71.6	67	124.1	111.7	27	168.6	151.9	87	213.2	192.0
48	35.7	32.1	08	80.2	72.3	68	124.8	112.4	28	169.4	152.5	88	213.9	192.7
49	36.4	32.8	09	81.0	72.9	69	125.5	113.1	29	170.1	153.2	89	214.7	193.3
50	37.1	32.5	10	81.7	73.6	70	126.3	113.7	30	170.9	153.9	90	215.4	194.0
51	37.9	34.1	111	82.5	74.3	171	127.0	114.4	231	171.6	154.5	291	216.2	194.7
52	38.6	34.8	12	83.2	74.9	72	127.8	115.1	32	172.3	155.2	92	216.9	195.3
53	39.4	35.5	13	83.9	75.6	73	128.5	115.7	33	173.1	155.9	93	217.7	196.0
54	40.1	36.1	14	84.7	76.3	74	129.3	116.4	34	173.8	156.5	94	218.4	196.7
55	40.9	36.8	15	85.4	76.9	75	130.0	117.1	35	174.6	157.2	95	219.1	197.4
56	41.6	37.5	16	86.2	77.6	76	130.7	117.7	36	175.5	157.9	96	219.9	198.0
57	42.3	38.1	17	86.9	78.3	77	131.5	118.4	37	176.1	158.5	97	220.6	198.7
58	43.1	38.8	18	87.7	78.9	78	132.2	119.1	38	176.8	159.2	98	221.4	199.4
59	43.8	39.5	19	88.4	79.6	79	133.0	119.7	39	177.5	159.9	99	222.1	200.5
60	44.6	40.1	20	89.1	80.2	80	133.7	120.4	40	178.3	160.6	300	222.9	200.8
Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat	Dist	Dep.	Lat.

for 48 Degrees.

Difference of Latitude and Departure for 43 Degrees:

Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.
1	00.7	00.7	61	44.6	41.6	121	88.5	82.5	181	132.4	123.4	241	176.3	164.3
2	01.5	01.4	62	45.3	42.3	22	89.2	83.2	82	133.1	124.1	42	177.0	165.0
3	02.2	02.0	63	46.1	43.0	23	90.0	83.9	83	133.8	124.8	43	177.7	165.7
4	02.9	02.7	64	46.8	43.6	24	90.7	84.5	84	134.6	125.5	44	178.4	166.4
5	03.7	03.4	65	47.5	44.3	25	91.4	85.2	85	135.3	126.2	45	179.2	167.1
6	04.4	04.1	66	48.3	45.0	26	92.1	85.9	86	136.0	126.8	46	179.9	167.7
7	05.1	04.8	67	49.0	45.7	27	92.9	86.6	87	136.8	127.5	47	180.6	168.4
8	05.9	05.5	68	49.7	46.4	28	93.6	87.3	88	137.5	128.2	48	181.4	169.1
9	06.6	06.2	69	50.5	47.1	29	94.3	88.0	89	138.2	128.9	49	182.1	169.8
10	07.3	06.8	70	51.2	47.7	30	95.1	88.6	90	139.0	129.5	50	182.8	170.5
11	08.0	07.5	71	51.9	48.4	131	95.8	89.3	191	139.7	130.2	251	183.6	171.2
12	08.8	08.2	72	52.7	49.1	32	96.5	90.0	92	140.4	130.9	52	184.3	171.8
13	09.5	08.9	73	53.4	49.8	33	97.3	90.7	93	141.1	131.6	53	185.0	172.5
14	10.2	09.5	74	54.1	50.5	34	98.0	91.4	94	141.9	132.3	54	185.8	173.2
15	11.0	10.2	75	54.9	51.2	35	98.7	92.1	95	142.6	133.0	55	186.5	173.9
16	11.7	10.9	76	55.6	51.8	36	99.5	92.7	96	143.3	133.6	56	187.2	174.5
17	12.4	11.6	77	56.3	52.5	37	100.2	93.4	97	144.1	134.3	57	187.9	175.2
18	13.2	12.3	78	57.0	53.2	38	100.9	94.1	98	144.8	135.0	58	188.7	175.9
19	13.9	13.0	79	57.8	53.9	39	101.7	94.8	99	145.5	135.7	59	189.4	176.6
20	14.6	13.6	80	58.5	54.5	40	102.4	95.5	200	146.3	136.4	60	190.1	177.3
21	15.4	14.3	81	59.2	55.2	141	103.1	96.2	201	147.0	137.1	261	190.9	178.0
22	16.1	15.0	82	60.0	55.9	42	103.9	96.8	02	147.7	137.7	62	191.6	178.6
23	16.8	15.7	83	60.7	56.6	43	104.6	97.5	03	148.5	138.4	63	192.3	179.3
24	17.6	16.4	84	61.4	57.3	44	105.3	98.2	04	149.2	139.1	64	193.1	180.0
25	18.3	17.1	85	62.2	58.0	45	106.0	98.9	05	149.9	139.8	65	193.8	180.7
26	19.0	17.7	86	62.9	58.6	46	106.8	99.5	06	150.7	140.5	66	194.5	181.4
27	19.7	18.4	87	63.6	59.3	47	107.5	100.2	07	151.4	141.2	67	195.3	182.1
28	20.5	19.1	88	64.4	60.0	48	108.2	100.9	08	152.1	141.8	68	196.0	182.7
29	21.2	19.8	89	65.1	60.7	49	109.0	101.6	09	152.9	142.5	69	196.7	183.4
30	21.9	20.5	90	65.8	61.4	50	109.7	102.3	10	153.6	143.2	70	197.5	184.1
31	22.7	21.2	91	66.2	62.3	151	110.4	103.0	211	154.3	143.9	271	198.2	184.8
32	23.4	21.8	92	67.3	62.7	52	111.2	103.6	12	155.0	144.5	72	198.9	185.5
33	24.1	22.5	93	68.0	63.4	53	111.9	104.3	13	155.8	145.2	73	199.7	186.2
34	24.9	23.2	94	68.7	64.1	54	112.6	105.0	14	156.5	145.9	74	200.4	186.8
35	25.6	23.9	95	69.5	64.8	55	113.4	105.7	15	157.2	146.6	75	201.1	187.5
36	26.3	24.5	96	70.2	65.5	56	114.1	106.4	16	158.0	147.3	76	201.9	188.2
37	27.1	25.2	97	70.9	66.2	57	114.8	107.1	17	158.7	148.0	77	202.6	188.9
38	27.8	25.9	98	71.7	66.8	58	115.6	107.7	18	159.4	148.6	78	203.3	189.5
39	28.5	26.6	99	72.4	67.5	59	116.3	108.4	19	160.2	149.3	79	204.0	190.2
40	29.3	27.3	100	73.1	68.2	60	117.0	109.1	20	160.9	150.0	80	204.8	190.9
41	30.0	28.0	101	73.9	68.9	161	117.7	109.8	221	161.6	150.7	281	205.5	191.6
42	30.7	28.6	02	74.6	69.5	62	118.5	110.5	22	162.4	151.4	82	206.2	192.3
43	31.4	29.3	03	75.3	70.2	63	119.2	111.2	23	163.1	152.1	83	207.0	193.0
44	32.2	30.0	04	76.1	70.9	64	119.9	111.8	24	163.8	152.7	84	207.7	193.6
45	32.9	30.7	05	76.8	71.6	65	120.7	112.5	25	164.6	153.4	85	208.4	194.3
46	33.6	31.4	06	77.5	72.3	66	121.4	113.2	26	165.3	154.1	86	209.2	195.0
47	34.4	32.1	07	78.3	73.0	67	122.1	113.9	27	166.0	154.8	87	209.9	195.7
48	35.1	32.7	08	79.0	73.6	68	122.9	114.5	28	166.7	155.5	88	210.6	196.4
49	35.8	33.4	09	79.7	74.3	69	123.6	115.2	29	167.5	156.2	89	211.4	197.1
50	36.6	34.1	10	80.4	75.0	70	124.3	115.9	30	168.1	156.8	90	212.1	197.7
51	37.3	34.8	111	81.2	75.7	171	125.1	116.6	231	168.9	157.5	291	212.8	198.4
52	38.0	35.5	12	81.9	76.4	72	125.8	117.3	32	169.7	158.2	92	213.6	199.1
53	38.8	36.2	13	82.6	77.1	73	126.5	118.0	33	170.4	158.9	93	214.3	199.8
54	39.5	36.8	14	83.4	77.7	74	127.3	118.6	34	171.1	159.5	94	215.0	200.5
55	40.2	37.5	15	84.1	78.4	75	128.0	119.3	35	171.9	160.2	95	215.7	201.2
56	41.0	38.2	16	84.8	79.1	76	128.7	120.0	36	172.6	160.9	96	216.5	201.8
57	41.7	38.9	17	85.6	79.8	77	129.4	120.7	37	173.3	161.6	97	217.2	102.5
58	42.4	39.5	18	86.3	80.5	78	130.2	121.4	38	174.1	162.3	98	218.0	203.2
59	43.1	40.2	19	87.0	81.2	79	130.9	122.1	39	174.8	163.0	99	218.7	203.9
60	43.9	40.9	20	87.8	81.8	80	131.6	122.7	40	175.5	163.6	300	219.4	204.6
Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.

for 47 Degrees.

Difference of Latitude and Departure for 44 Degrees.

Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.	Diſt	Lat.	Dep.
1	00.7	00.7	61	43.9	42.4	121	87.0	84.0	181	130.2	125.7	241	173.4	167.4
2	01.4	01.4	62	44.6	43.1	22	87.8	84.7	82	130.9	126.4	42	174.1	168.1
3	02.2	02.1	63	45.3	43.8	23	88.5	85.4	83	131.6	127.1	43	174.8	168.8
4	02.9	02.8	64	46.0	44.5	24	89.2	86.1	84	132.4	127.8	44	175.5	169.5
5	03.6	03.5	65	46.8	45.1	25	89.9	86.8	85	133.1	128.5	45	176.2	170.2
6	04.3	04.2	66	47.7	45.8	26	90.6	87.5	86	133.8	129.2	46	176.9	170.9
7	05.0	04.9	67	48.2	46.5	27	91.4	88.2	87	134.5	129.9	47	177.7	171.6
8	05.8	05.6	68	48.9	47.2	28	92.1	88.9	88	135.2	130.6	48	178.4	172.3
9	06.5	06.3	69	49.6	47.9	29	92.8	89.6	89	135.9	131.3	49	179.1	173.0
10	07.2	06.9	70	50.4	48.6	30	93.5	90.3	90	136.7	132.0	50	179.8	173.6
11	07.9	07.6	71	51.1	49.3	131	94.2	91.0	191	137.4	132.7	251	180.5	174.3
12	08.6	08.3	72	51.8	50.0	32	94.9	91.7	92	138.1	133.4	52	181.3	175.0
13	09.4	09.0	73	52.5	50.7	33	95.7	92.4	93	138.8	134.1	53	182.0	175.7
14	10.1	09.7	74	53.2	51.4	34	96.4	93.1	94	139.5	134.8	54	182.7	176.4
15	10.8	10.4	75	53.9	52.1	35	97.1	93.8	95	140.3	135.4	55	183.4	177.1
16	11.5	11.1	76	54.7	52.8	36	97.8	94.5	96	141.0	136.1	56	184.1	177.8
17	12.2	11.8	77	55.4	53.5	37	98.5	95.2	97	141.7	136.8	57	184.9	178.5
18	12.9	12.5	78	56.1	54.2	38	99.3	95.9	98	142.4	137.5	58	185.6	179.2
19	13.7	13.2	79	56.8	54.9	39	100.0	96.5	99	143.1	138.2	59	186.3	179.9
20	14.4	13.9	80	57.5	55.6	40	100.7	97.2	200	143.9	138.9	60	187.0	180.6
21	15.1	14.6	81	58.3	56.3	141	101.4	97.9	201	144.6	139.6	261	187.7	181.3
22	15.8	15.3	82	59.0	57.0	42	102.1	98.6	02	145.3	140.3	62	188.4	182.0
23	16.5	16.0	83	59.7	57.7	43	102.9	99.3	03	146.0	141.0	63	189.2	182.7
24	17.3	16.7	84	60.4	58.3	44	103.6	100.0	04	146.7	141.7	64	189.9	183.4
25	18.0	17.4	85	61.1	59.0	45	104.3	100.7	05	147.5	142.4	65	190.6	184.1
26	18.7	18.1	86	61.9	59.7	46	105.0	101.4	06	148.2	143.1	66	191.3	184.8
27	19.4	18.8	87	62.6	60.4	47	105.7	102.1	07	148.9	143.8	67	192.1	185.5
28	20.1	19.4	88	63.3	61.1	48	106.5	102.8	08	149.6	144.5	68	192.8	186.1
29	20.9	20.1	89	64.0	61.8	49	107.2	103.5	09	150.3	145.2	69	193.5	186.8
30	21.6	20.8	90	64.7	62.5	50	107.9	104.2	10	151.1	145.9	70	194.2	187.5
31	22.3	21.5	91	65.5	63.2	151	108.6	104.9	211	151.8	146.6	271	194.9	188.2
32	23.0	22.2	92	66.2	63.9	52	109.3	105.6	12	152.5	147.3	72	195.6	188.9
33	23.7	22.9	93	66.9	64.6	53	110.1	106.3	13	153.2	147.9	73	196.4	189.6
34	24.5	23.6	94	67.6	65.3	54	110.8	107.0	14	153.9	148.6	74	197.1	190.3
35	25.2	24.3	95	68.3	66.0	55	111.5	107.7	15	154.6	149.3	75	197.8	191.0
36	25.9	25.0	96	69.1	66.7	56	112.2	108.4	16	155.4	150.0	76	198.5	191.7
37	26.6	25.7	97	69.8	67.4	57	112.9	109.1	17	156.1	150.7	77	199.2	192.4
38	27.3	26.4	98	70.5	68.1	58	113.1	109.7	18	156.8	151.4	78	200.0	193.1
39	28.1	27.1	99	71.2	68.8	59	114.4	110.4	19	157.5	152.1	79	200.7	193.8
40	28.8	27.8	100	71.9	69.5	60	115.1	111.1	20	158.2	152.8	80	201.4	194.5
41	29.5	28.5	101	72.6	70.2	161	115.8	111.8	221	159.0	153.5	281	202.1	195.2
42	30.2	29.2	02	73.4	70.8	62	116.5	112.5	22	159.7	154.2	82	202.8	195.9
43	30.9	29.9	03	74.1	71.5	63	117.2	113.2	23	160.4	154.9	83	203.6	196.6
44	31.6	30.6	04	74.8	72.2	64	118.0	113.9	24	161.1	155.6	84	204.3	197.3
45	32.4	31.3	05	75.5	72.9	65	118.7	114.6	25	161.8	156.3	85	205.0	198.0
46	33.1	32.0	06	76.2	73.6	66	119.4	115.3	26	162.6	157.0	86	205.7	198.7
47	33.8	32.6	07	77.0	74.3	67	120.1	116.0	27	163.3	157.7	87	206.4	199.3
48	34.5	33.3	08	77.7	75.0	68	120.8	116.7	28	164.0	158.4	88	207.2	200.0
49	35.2	34.0	09	78.4	75.7	69	121.6	117.4	29	164.7	159.1	89	207.9	200.7
50	36.0	34.7	10	79.1	76.4	70	122.3	118.1	30	165.4	159.8	90	208.6	201.4
51	36.7	35.4	111	79.8	77.1	71	123.0	118.8	231	166.2	160.4	291	209.3	202.1
52	37.4	36.1	12	80.6	77.8	72	123.7	119.5	32	166.9	161.1	92	210.0	202.8
53	38.1	36.8	13	81.3	78.5	73	124.4	120.2	33	167.6	161.8	93	210.8	203.5
54	38.8	37.5	14	82.0	79.2	74	125.2	120.9	34	168.3	162.5	94	211.5	204.2
55	39.6	38.2	15	82.7	79.9	75	125.9	121.6	35	169.0	163.2	95	212.2	204.9
56	40.3	38.9	16	83.4	80.6	76	126.6	122.2	36	169.8	163.9	96	212.9	205.6
57	41.0	39.6	17	84.2	81.3	77	127.3	122.9	37	170.5	164.6	97	213.6	206.3
58	41.7	40.3	18	84.9	82.0	78	128.0	123.6	38	171.2	165.3	98	214.4	207.0
59	42.4	41.0	19	85.6	82.7	79	128.8	124.3	39	171.9	166.0	99	215.1	207.7
60	43.2	41.7	20	86.3	83.4	80	129.5	125.0	40	172.6	166.7	300	215.8	208.4
Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep.	Lat.	Diſt	Dep	Lat.

for 46 Degrees.

Difference of Latitude and Departure for 45 Degrees.

Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.	Dist	Lat.	Dep.
1	00.7	00.7	61	43.1	43.1	121	85.6	85.6	181	128.0	128.0	241	170.4	170.4
2	01.4	01.4	62	43.8	43.8	22	86.3	86.3	82	128.7	128.7	42	171.1	171.1
3	02.1	02.1	63	44.5	44.5	23	87.0	87.0	83	129.4	129.4	43	171.8	171.8
4	02.8	02.8	64	45.3	45.3	24	87.7	87.7	84	130.1	130.1	44	172.5	172.5
5	03.5	03.5	65	46.0	46.0	25	88.4	88.4	85	130.8	130.8	45	173.2	173.2
6	04.2	04.2	66	46.7	46.7	26	89.1	89.1	86	131.5	131.5	46	173.9	173.9
7	04.9	04.9	67	47.4	47.4	27	89.8	89.8	87	132.1	132.1	47	174.6	174.6
8	05.7	05.7	68	48.1	48.1	28	90.5	90.5	88	132.9	132.9	48	175.4	175.4
9	06.4	06.4	69	48.8	48.8	29	91.2	91.2	89	133.6	133.6	49	176.1	176.1
10	07.1	07.1	70	49.5	49.5	30	91.9	91.9	90	134.3	134.3	50	176.8	176.8
11	07.8	07.8	71	50.2	50.2	131	92.6	92.6	191	135.1	135.1	251	177.5	177.5
12	08.5	08.5	72	50.9	50.9	32	93.3	93.3	92	135.8	135.8	52	178.2	178.2
13	09.2	09.2	73	51.6	51.6	33	94.0	94.0	93	136.5	136.5	53	178.9	178.9
14	09.9	09.9	74	52.3	52.3	34	94.7	94.7	94	137.2	137.2	54	179.6	179.6
15	10.6	10.6	75	53.0	53.0	35	95.5	95.5	95	137.9	137.9	55	180.3	180.3
16	11.3	11.3	76	53.7	53.7	36	96.2	96.2	96	138.6	138.6	56	181.0	181.0
17	12.0	12.0	77	54.4	54.4	37	96.9	96.9	97	139.3	139.3	57	181.7	181.7
18	12.7	12.7	78	55.2	55.2	38	97.6	97.6	98	140.0	140.0	58	182.4	182.4
19	13.4	13.4	79	55.9	55.9	39	98.3	98.3	99	140.7	140.7	59	183.1	183.1
20	14.1	14.1	80	56.6	56.6	40	99.0	99.0	200	141.4	141.4	60	183.8	183.8
21	14.8	14.8	81	57.3	57.3	141	99.7	99.7	201	142.1	142.1	261	184.5	184.5
22	15.6	15.6	82	58.0	58.0	42	100.4	100.4	02	142.8	142.8	62	185.3	185.3
23	16.3	16.3	83	58.7	58.7	43	101.1	101.1	03	143.5	143.5	63	186.0	186.0
24	17.0	17.0	84	59.4	59.4	44	101.8	101.8	04	144.2	144.2	64	186.7	186.7
25	17.7	17.7	85	60.1	60.1	45	102.5	102.5	05	144.9	144.9	65	187.4	187.4
26	18.4	18.4	86	60.8	60.8	46	103.2	103.2	06	145.7	145.7	66	188.1	188.1
27	19.1	19.1	87	61.5	61.5	47	103.9	103.9	07	146.4	146.4	67	188.8	188.8
28	19.8	19.8	88	62.2	62.2	48	104.6	104.6	08	147.1	147.1	68	189.5	189.5
29	20.5	20.5	89	62.9	62.9	49	105.4	105.4	09	147.8	147.8	69	190.2	190.2
30	21.2	21.2	90	63.6	63.6	50	106.1	106.1	10	148.5	148.5	70	190.9	190.9
31	21.9	21.9	91	64.3	64.3	151	106.8	106.8	211	149.2	149.2	271	191.6	191.6
32	22.6	22.6	92	65.1	65.1	52	107.5	107.5	12	149.9	149.9	72	192.3	192.3
33	23.3	23.3	93	65.8	65.8	53	108.2	108.2	13	150.6	150.6	73	193.0	193.0
34	24.0	24.0	94	66.5	66.5	54	108.9	108.9	14	151.3	151.3	74	193.7	193.7
35	24.7	24.7	95	67.2	67.2	55	109.6	109.6	15	152.0	152.0	75	194.4	194.4
36	25.5	25.5	96	67.9	67.9	56	110.3	110.3	16	152.7	152.7	76	195.2	195.2
37	26.2	26.2	97	68.6	68.6	57	111.0	111.0	17	153.4	153.4	77	195.9	195.9
38	26.9	26.9	98	69.3	69.3	58	111.7	111.7	18	154.1	154.1	78	196.6	196.6
39	27.6	27.6	99	70.0	70.0	59	112.4	112.4	19	154.8	154.8	79	197.3	197.3
40	28.3	28.3	100	70.7	70.7	60	113.1	113.1	20	155.6	155.6	80	198.0	198.0
41	29.0	29.0	101	71.4	71.4	161	113.8	113.8	221	156.3	156.3	281	198.7	198.7
42	29.7	29.7	02	72.1	72.1	62	114.5	114.5	22	157.0	157.0	82	199.4	199.4
43	30.4	30.4	03	72.8	73.8	63	115.3	115.3	23	157.7	157.7	83	200.1	200.1
44	31.1	31.1	04	73.5	73.5	64	116.0	116.0	24	158.4	158.4	84	200.8	200.8
45	31.8	31.8	05	74.2	74.2	65	116.7	116.7	25	159.1	159.1	85	201.5	201.5
46	32.5	32.5	06	74.9	74.9	66	117.4	117.4	26	159.8	159.8	86	202.2	202.2
47	33.2	33.2	07	75.7	75.7	67	118.1	118.1	27	160.5	160.5	87	202.9	202.9
48	33.9	33.9	08	76.4	76.4	68	118.8	118.8	28	161.2	161.2	88	203.6	203.6
49	34.6	34.6	09	77.1	77.1	69	119.5	119.5	29	161.9	161.9	89	204.3	204.3
50	35.4	35.4	10	77.8	77.8	70	120.2	120.2	30	162.6	162.6	90	205.1	205.1
51	36.1	36.1	111	78.5	78.5	171	120.9	120.9	231	163.3	163.3	291	205.8	205.8
52	36.8	36.8	12	79.2	79.2	72	121.6	121.6	32	164.0	164.0	92	206.5	206.5
53	37.5	37.5	13	79.9	79.9	73	122.3	122.3	33	164.7	164.7	93	207.2	207.2
54	38.2	38.2	14	80.6	80.6	74	123.0	123.0	34	165.5	165.5	94	207.9	207.9
55	38.9	38.9	15	81.3	81.3	75	123.7	123.7	35	166.2	166.2	95	208.6	208.6
56	39.6	39.6	16	82.0	82.0	76	124.4	124.4	36	166.9	166.9	96	209.3	209.3
57	40.3	40.3	17	82.7	82.7	77	125.2	125.2	37	167.6	167.6	97	210.0	210.0
58	41.0	41.0	18	83.4	83.4	78	125.9	125.9	38	168.3	168.3	98	210.7	210.7
59	41.7	41.7	19	84.1	84.1	79	126.6	126.6	39	169.0	169.0	99	211.4	211.4
60	42.4	42.4	20	84.8	84.8	80	127.3	127.3	40	169.7	169.7	300	212.1	212.1
Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.	Dist	Dep.	Lat.

for 45 Degrees.

South Coast of England, bounding the Britiſh Channel, and the oppoſite Coaſt of France; with the Latitudes and Longitudes, and Time of High Water, and the Time the Current runs in the Offing of ſome Places.

Engliſh Coaſt.	H.W. H.M.	Lat. D.M.	Long. D.M.
North Foreland	10 30	51 25N	1 34E.
Ramſgate	10 30	51 20	1 30
Deal	10 30	51 14	1 30
The Downs	10 30	51 25	1 35
South Foreland	10 30	51 12	1 30
Dover	10 30	51 7	1 22
Rye	11 15	51 3	0 50
Dungeneſs	9 45	50 57	0 6
Haſtings	10 15	50 52	1 34
Beachy Head	9 55	50 48	0 20
Brighthelmſtone	9 55	50 50	0 0W
Arundel	9 45	50 50	0 30
Shoreham	9 45	50 51	0 15
The Owers	9 15	50 39	0 40
ChicheſterHarbour	11 30	50 47	0 55
Portſmouth	11 15	50 48	1 4
Spithead Road	9 30	50 48	1 6
Cowes I. of Wight	10 45	50 48	1 16
St. Helen's Road	9 0	50 43	0 55
Bembridge, I. Wi.	10 15	50 40	0 52
Dunnoſe	9 15	50 35	1 21
Catharine's Point	8 35	50 34	1 14
Needles 10h. 15m.	9 30	50 42	1 34
Chriſt Church	8 35	50 46	1 44
Pool, Dorſetſhire	9 0	50 46	1 54
Peveral Point	8 45	50 36	1 50
St. Alban's Head	8 30	50 35	2 0
Weymouth	7 30	50 38	2 30
Bill of Portland	7 15	50 31	2 30
Exmouth Bar	6 30	50 38	3 30
Exeter	0 0	50 45	3 39
Torbay	5 15	50 28	3 38
Dartmouth	5 15	50 25	3 36
Start Point	6 10	50 6	3 45
Prall, S.P. of Dev	6 10	50 15	3 53
Plymouth	6 15	50 25	4 20
Eddiſtone	5 45	50 9	4 19
Ram Head	6 0	50 21	4 20
Falmouth	5 20	50 10	5 12
Lizard Point	4 30	49 57	5 14
Mount's Bay	5 0	50 5	5 45
Land's End	4 30	50 6	6
Scilly I.	3 45	50 6	6 49
St. Marie's I.	3 45	49 58	6 40
Aldern. & Caſkets	12 0	49 48	2 10
Guern. I. & Sark I.	1 30	49 30	2 47
Jerſey I.	0 30	49 7	2 6
St. Agnes' Light H.		49 56	6 41

French Coaſt.	H.W. H.M.	Lat. D.M.	Long. D.M.
Dunkirk	12 0	51 5N	2 27E.
Graveline	11 43	51 0	2 12
Calais	11 30	50 57	1 56
Cape Criſnez	11 30	50 50	1 40
Boulogne	10 30	50 43	1 42
Abbeville	10 30	50 7	1 56
Dieppe	10 30	49 57	1 9
Havre de Grace	9 0	49 33	0 17
Rouen up R. Sein	1 15	49 27	1 15
Sein R. Mouth	9 0	49 30	0 10
Caen	9 0	49 11	0 16W
C. Barfleur	7 30	49 40	1 12
Cherburg	7 10	49 38	1 34
C. de la Hogue	12 0	49 45	1 55
Coutance	6 0	49 2	1 30
Granville	6 0	48 50	1 36
Avranches	6 0	48 41	1 24
St. Malo	6 0	48 39	1 57
Seven Iſlands	0 0	48 48	3 25
Iſle de Bas	3 45	48 45	3 55
Uſhant	5 15	48 30	4 59
Breſt	3 45	48 23	4 26

The Current in the Mid. Channel in N. E. about 1 H. 30 M. after High Water; and it runs off Dungeneſs 4 H. to 4 and an Half Hours; in the Downs 4 Hours; and Eaſt in the King's Channel, 3 Hours after High Water

The following Table ſhews the Time of High Water at the principal Headlands, &c. in the Channel, on Full and Change Days, and the Time the Current runs after High Water.

High Water.	H.M.	The Current runs after H.W. H M.	And the Time the Current has done running. H. M.
At the Lizard at	4 30	3 0	7 30
Off the Eddiſtone	5 30	3 0	8 30
Off the Start	6 10	2 30	8 30
Off Portland	7 15	3 0	10 15
Off I. of Wight	8 14	3 15	11 30
Off Arundel and Shorham	9 15	1 15	10 30
Off Beachy	9 45	1 15	11 0
Off Dungeneſs	10 30	4 0	2 30

Note, H. W. ſtands for High Water; R. for River; I. for Iſland; P. for Point; and C. for Cape.——The Longitude is reckoned from the Meridian of London.

Note. The Variation in the Engliſh, St. George's Channels, and on the Eaſt Coaſt of England is about 24 Degrees Weſt, and about the Orkneys and Shetland Iſlands about 2 Points, one the Weſtern Coaſt of Ireland 24° Weſt, and is found to vary between 11 and 12 Minutes Weſterly every Year, or a Degree in about $5\frac{1}{2}$ Years, therefore, by adding a Degree for every $5\frac{1}{2}$ Years to the Variation here given for 1784, you will have the Variation nearly for any ſucceeding year.

From Land's End Weſtward round the Coaſt of Great Britain.

	H.W H.M.	Lat. D.M.	Long. D.M.
Land's End	4 30	50 6	6 0W
C. Cornwall	4 30	50 10	5 50
St. Ives Bay	5 0	50 8	5 22
Hartland Point	4 33	51 3	4 30
Lundy Iſland	5 15	51 13	4 50
Barnſtaple		51 6	4 24
Boggy Point	5 20	51 10	4 27
Morte Point		51 13	4 25
Foreland Point		51 16	4 1
King's Road	6 50	51 29	2 50
Briſtol	7 4	51 29	2 40
Caldy Iſle	5 30	51 37	4 50
Swanſea	6 0	51 40	4 1
Milford Haven light Houſe	6 0	51 45	5 0
Smalls Light Houſe	9 0	51 45	5 14
St. Bride's Bay	9 0	51 48	5 6
St. David's Head	6 0	51 55	5 10
Newport	7 0	52 0	4 55
Bardſey Iſle	8 30	52 58	4 50
Carnarvon	8 30	53 6	4 30
Holyhead N. Point	9 45	53 17	4 46
Skerries Light Houſe	9 45	53 24	4 44
Cheſter Bar	10 30	53 12	3 7
Liverpool	11 15	53 22	3 12
Lancaſter	11 15	54 5	3 0
Carliſle	11 15	54 55	3 0
Kirkudbright	11 0	54 45	3 53
St. Bee's Head Light Houſe	10 45	54 31	3 38
Edinburgh	4 30	55 58	3 12
Mull of Galloway	11 0	54 39	5 0
Arran Iſle	11 0	55 30	5 45
Mull of Cantire	10 30	55 17	6 0
Lewis's, S. Point		56 48	7 54
Lewis's, N. Point		58 37	6 54
Dungſby Head		58 45	3 6
Tarbet Neſs		57 50	3 36
Peter Head or Buchaneſs	3 0	57 30	1 34
Aberdeen	0 45	57 6	2 0
Fife Neſs		56 15	2 37
May Iſle Light Houſe	4 30	55 10	2 37
St. Abb's Head	2 30	55 54	1 58
Berwick	2 30	55 47	1 50
Holy Iſland	2 30	55 41	1 38W
Staples	2 30	55 39	1 30
Sunderland Point	2 30	55 35	1 32
Coquet Iſle	2 30	55 22	1 21
Tinmouth Caſtle	3 0	55 3	1 8
Tinmouth Lights		55 3	1 8
Sunderland	3 0	54 56	1 8
Hartlepool	3 30	54 45	1 2
Tees' Mouth	3 30	54 41	0 56
Whitby	3 45	54 33	0 26
Robinhood's Bay	3 45	54 29	0 22
Scarborough	4 30	54 20	0 10
Flamborough Head	4 30	54 11	0 8 E
Bridlington Bay		54 9	0 3
Spurn Head Lights	5 30	53 38	0 27
Boſton Harbour	6 0	53 0	0 35
Dudgeon Lights	8 0	53 20	1 15
Cromer	9 0	52 59	1 27
	H. W. H. M.	Lat. D. M·	Long. D. M.
Foulneſs LightHouſe	9 0	52 59	1 29W
Wintertonneſs Lights	9 45	52 49	1 50
Yarmouth	9 30	52 45	1 50
Leoſtoff 10	9 0	52 36	1 52
Leoſtoff Light Houſe		52 48	
Sole Bay	9 30	52 24	1 50
Orfordneſs	9 45	52 10	1 20
Harwich 10 h.30m.	11 15	52 0	1 20
Ipſwich 11	11 0	52 8	1 15
The Cur. runs till	1 0		
Kentiſh Knock the Eaſtermoſt Sand in the King's Channel, N. of the Downs.	10 30		1 40
King's Channel along the Swin Runs	10 30 12 0	51 38	1 16
Margate	11 0	51 25	1 20
The Nore	12 0	51 34	1 6
Sheerneſs	12 0	51 31	0 50
R. Medway, Rocheſter and Chatham	0 45	51 25	0 36
Graveſend	1 30	51 23	0 25
R. Thames London	2 46	51 32	0 0

Iſle of Man.

Calf of Man	10 30	54 1	4 38
Douglas	10 30	54 7	4 24
Ramſay Bay	10 30	54 17	4 21
Point Ayre	10 30	54 25	4 21
Peel Hill	10 30	54 12	4 35
Variation 24° Weſt.			

The Orkney Iſles.

Pentland Skerries Iſle	11 0	58 36	3 1W
Old Head, S. Point of Orkney I.	11 0	58 40	3 0
Ronaldſha N. Point of Ditto	10 30	59 22	2 30

Shetland Iſles.

Fair Iſle	4 0	59 30	1 38W
Foul Iſle	3 0	60 12	1 29
S. Point of the Shetland Iſles	3 0	59 54	1 59
Lambo Neſs N. P. of Ditto Iſles	4 0	61 15	2 0
Weſt Faro Iſlands		62 0	6 30
Rockal, looks like an Hay Stack		57 22	10 30

The Coaſt of Ireland.

Old Head Kinſale		51 31W	8 47
Kinſale Harbour		51 35	8 46
Cork Harbour		51 42	8 35
Youghall Bay		51 52	8 17
Dungarvon Bay		52 1	7 45
Waterford Haven	5 0	52 3	7 41
Saltees Rocks	5 30	52 3	7 [illegible]
Cernfore Point		52 11	6 51
Tuſker Rocks		52 11	6 45
Wexford Bay		52 21	6 52

	H. W. H. M.	Lat. D.M.	Long. D.M.
Mizen Head		52 52N.	6 39W
Wicklow Lighthouſe		52 58	6 38
Codlingridge Buoys		53 8	6 32
Dublin Bay	10 30	53 20	6 43
Hoth Lighthouſe		53 22	6 41
Lambay Iſland		53 28	6 40
St. Patrick's Iſland		53 35	6 35
Drogheda Bar		53 44	6 42
Dundalk Bay		53 57	6 42
Carlingford Bay		54 0	6 37
Newry		54 5	6 42
Strangford Bay		54 17	6 15
Mew Lighthouſe		54 41	6 4
Belfaſt	10 15	54 40	6 20
Larn Harbour		54 53	6 14
The Maids off Ditto		54 58	6 12
Fair Head		55 15	6 30
Raughlan Iſland	10 15	55 20	6 36
Fortruſh		55 15	7 0
Seven Heads	3 0	51 36	8 22
Cape Clear Weſtward	3 15	51 18	9 46
Faſtnet Rock	3 0	52 13	9 51
Crook Haven	3 0	51 19	9 55
Mizen Head	3 0	51 17	10 1
Dun Manus Bay		51 28	10 1
Sheep's Head	3 0	51 24	10 2
Bantree Bay		51 26	10 2
The Cow and Calf		51 26	10 22
Kennere River	3 0	51 37	10 14
The Skelling Rocks		51 40	10 34
The Blaſkets		51 58	10 36
Ballingſkellings Bay	3 15	51 42	9 14
Bray Head	3 30	51 47	10 30
Dingle Bay	3 30	51 55	10 26
Ferriters Iſles	3 30	51 55	10 36
Smeriwick Harbour	3 30	52 5	10 28
Brandon Head Bay		52 10	10 23
Carry Head		52 15	10 13
Loop Head, or Mouth of River Shannon	3 45	52 23	10 14
Galiway Bay	6 30	53 10	9 30
Sline Head	7 0	53 20	10 40
Black Rocks		53 55	10 47
Broad Haven	7 0	54 6	10 38
Donnegall Bay		54 30	8 45
Cape Telling		54 38	9 23
Tory Iſland		55 9	8 50
North Cape		55 15	8 30
Entrance of Londonderry Lough	7 30	55 12	7 30
Mouth of the Bann River		55 10	7 17
Carrickfergus Bay		54 45	6 10

Weſt Coaſt of France.

Iſle of Uſhant	5 13	48 30 N	4 59W
Breſt	3 45	48 23	4 26
Penmark Point	3 0	47 50	4 20
Belle Iſle	3 30	47 21	3 13
Angers	0 0	47 28	0 34
Rochelle	3 45	46 10	1 11
Nantz	6 0	47 13	1 30
Bourdeaux	3 0	44 50	0 30
Bayonne	3 30	43 29	1 25

Weſt Coaſt of Spain and Portugal.

Cape Ortegal	3 0	43 47 N	7 34W
Cape Pinas	3 0	43 51	5 47
C. Corunna	3 0	43 56	9 10
C. Prior	0 0	43 38	8 25
C. Finiſterre	3 15	42 52	9 13
Ville del Conde		41 11	8 20
Oporta, or Porta Port	3 15	41 10	8 22
Bayonna	4 45	42 3	8 45
Burlings		39 30	9 20
Liſbon	2 45	38 42	9 3
C. Roxent	1 0	38 46	9 30
C. St. Vincent		37 2	8 45
Cadiz 6	4 30	36 31	6 13
Cape Treſalgar		36 10	5 53
Gibraltar	2 0	36 6	4 53

The Coaſts on the Main Continent within the Straits.

Places Names.	Lat. D. M.	Long. D. M.
Malaga	36 42 N	4 0W
Cape de Gat	36 40	1 40
Cape Paul	38 15	0 1
Alicant	38 35	0 15
Cape St. Martin	38 46	0 30 E
Valencia	39 35	0 0
Barcelona	41 26	2 18
Marſeilles	43 18	5 27
Toulon	43 17	6 3
Genoa	44 25	8 40
Leghorn	43 28	10 30
Civita Vecchia	42 5	11 51
Rome	41 54	12 34
Naples	40 51	14 20
Cape Sparteyento	37 55	16 45
Cape Colonne	38 56	18 1
Gallipoli	40 23	18 23
Cape St. Maria, or Lucia	39 45	19 0
Ancona	43 40	13 30
Venetio, or Venice	45 25	12 4
Zara	44 30	16 35
Raguſa	42 10	18 50
Cattaro	42 47	19 17
La Valona	40 35	21 15
Lepanto	38 20	22 42
Cape Matapan, or Caliga	36 33	22 41
Cape St. Angelo, or Angulo	36 32	23 56
Athens	38 58	24 5
Cape Martelo South Point of Negropont	38 7	25 3
Cape Colom, or Colonne	37 45	24 42
Salonica	40 41	23 13
Cape Monte Sancto	40 26	25 2
Gallipoli	40 53	27 20
Conſtantinople	41 1	28 57
Cape Barbador, or Baba	39 30	26 30
Smyrna	38 28	27 25
Cape Barbernola, or Blane	38 9	26 32
Epheſus	38 1	27 53
Antiochetta	36 10	36 17
Scandaroon; or Alexandretta	36 34	36 26

Places Names.	Lat. D. M.	Long. D. M.
Antioch	36 11N.	36 18 E.
Aleppo	35 42	37 24
Tortoſa	35 4	36 20
Tripoli	34 48	36 5
Joppa, or Jaffa	32 45	36 0
Jeruſalem	31 51	35 25
Alexandria	31 10	30 19
Cape Ruſata	32 41	21 25
Cape Meſurata	32 21	16 17
Tripola	32 54	13 10
Suſa	35 53	10 34
Cape Bona	37 3	11 4
Tunis	36 50	10 17
Bona	37 5	8 19
Seven Capes	37 15	7 0
Gigeri	37 14	6 15
Cape Tidelles, or Delly's	37 15	4 18
Algier	36 50	2 19
Cape Tenes	36 45	1 50
Oran	36 2	0 26
Cape Tres Forcas	35 30	2 4W
Ceuta	35 54	4 45
Tangier	35 52	5 45

Iſlands within the Straits.

Alboram	36 0N.	2 27E
Formentaria	38 33	1 15
Ivica	38 50	1 39
Majorca	39 29	2 35
Minorca	39 51	4 0
C. Tolare, So. End of	38 50	9 12
C. Reperade N. Sardin.	41 10	9 50
Aſinaria	41 3	8 48
Bonifacio, So. End of	41 24	9 46
C. Corſo, Nor. Corſica	42 56	9 50
Caprya	43 3	10 17
Liboa, or Elba	42 45	10 40
M. Chriſto	42 17	11 0
Palmoralla, or Palmeria	41 3	13 5
Ponza	41 0	13 7
Iſchia, or Eſchia	40 34	13 35
Liſſa,	43 6	15 40
Agoſta	42 58	17 20
Corcola	43 3	17 32
Strombello	38 58	16 0
Volcano	38 27	15 33
Telicur	38 35	15 0
Allicur	38 36	14 42
Uſtica	38 36	13 32
Trepano W. End of Sicilly,	37 57	13 13
Palermo	38 6	13 50
C. Paſſero E. End of	36 38	15 40
Meſſina in	38 38	16 20
Syracuſe in	37 7	15 45
Pantaloria	36 48	12 30
Limoſa	35 56	13 11
Lampidoſa	35 34	12 46
Malta	35 53	14 32
Ouvre Poel, a Rock	35 45	16 36

	Lat. D. M.	Long. D. M.
Melada	42 52N.	18 6E.
Corfu	39 42	29 46
Cephalonia	38 15	20 10
Zante	37 46	21 14
Sapienſa	36 46	21 45

Iſlands in the Archipelago.

Taſſo	40 4	25 17E.
Lemnos	39 59	25 37
Metyline Cape Sygre	39 15	26 5
P. Olivia	38 57	27 0
Siatto, or Schate	39 22	23 58
Scio, or Xio	38 22	26 12
Patmos	37 20	26 55
Tino	37 35	25 36
Zio, or Sea	37 37	24 50
Ferminia, Fermina, or Termie	37 24	24 58
Serfante, or Sifanto	36 58	25 20
Milo	36 40	25 0
W. End of Candia. Cape St. John	35 10	24 0
E. Cape Solom.	35 0	27 8
Rhodes N. End of Cape	36 27	28 28
S. End Tranquil	35 52	28 28
S.W. End of Cyprus. C. Baffa	34 57	32 23
Eaſt. C. St. Andr.	35 31	35 0
Sout. C. de Catte	34 30	33 10

Coaſt of Greenland.

	H.W.		
Nova Sem. and Iſles			
Shetland S. Point.		59 56N	1 30W
North ditto	3 0	60 50	0 10
Hangcliff	Var.		
Entr. of Brazy S.	23 45	60 9	0 38

Coaſt of Iceland.

Sound Royal		66 22	14 30W
Bargazar Point		66 20	16 32
Whale's Back		65 26	20 32
Merchant's Forel		63 24	17 5
Halliford		64 30	27 20
Fair Foreland		66 18	26 30
Grim's Iſlands		67 13	22 32
Weſtmonia Iſles		63 28	22 22
Iſles of Ferre, or Farro		62 4	5 0
Beerenburg, or Joan Main Iſle		71 33	4 30

Coaſt of Greenland.

Point Look-out	Var.	76 24	15 33E.
Horn Sound	Weſt.	76 45	13 34
Bell Sound		77 12	12 45
Charles I. Black Point		77 30	11 15

	Va.W	Lat. D.M.	Long. D.M.
C. Cold N. end Charles I.	18 36	79 6	11 2 E
Iſle Amſterdam		79 40	12 45
Fair Foreland		79 18	10 50
Hacluit's Headland	17 40	79 49	10 46
Cloven Cliff	18 24	79 43	9 56
Muffin Iſle	18 13	80 19	11 20
Black Point	9 42	78 28	18 38
Table I. one of the Seven	9 33	80 57	20 34
Smeerenburg	18 53	79 44	11 48
Dunkin's Iſle in Vogel Sound	18 47	79 42	9 59
	10 38	79 52	12 30
Hope Iſland		76 15	23 40
Cherry, or Bear Iſle		74 28	18 0
Admiralty Iſle		75 0	54 40

From Wiegate Straits to the Naze.

Nova Sembla		78 0 N	70 0 E
Wiegate Straits		69 30	62 2
Cape Candinoſe		68 45	43 15
Cape Bars		66 36	41 50
Cat Noſe		65 27	38 30
Archangel		64 34	38 58
Cape Bona Fortuna		66 0	40 48
Croſs Iſland		66 25	40 8
Sweetnoſe		68 7	39 54
River Kola Entrance		69 30	35 35
Kilduyn I.		69 34	35 45
Fiſher's I.		70 27	33 25
North Cape		71 10	26 15
Surroy		71 7	23 8
Tromſound Io		69 20	18 40
Samien I. S. W. Pt.		69 35	16 15
Lefort, S. W. Pt.		68 35	11 12
Werro, Iſland		67 43	9 15
Drontheim		63 26	11 10
Kate Neſs		61 25	6 0
Hearle, S. end		60 15	6 1
North Bergen		60 10	6 10
Bommel I. N. Pt.		59 25	6 2
Whiting eye Lights		59 5	6 12
Judder		58 25	6 5
The Naze of Norway		57 59	7 15
Ferder Lights		58 25	10 3
Chriſtiana		59 42	10 7

Coaſt in the Sound and Baltic.

Koll Lights		56 19	12 43
Elſinore		56 3	12 4
Copenhagen		55 41	12 46
Falſterbo Lights		55 25	12 54
Kalemer		56 40	16 30
Bornholm, I. N. Pt.		55 22	14 40
Stockholm		59 21	18 9
Gotland S. Point		56 56	18 34
Wybourg		60 50 N	29 12 E
Peterſburg		59 56	30 25
Memel		55 55	21 15
Narva		59 15	28 20
Demes Neſs Lights		57 39	22 21
Koningſberg		54 40	21 53
Dantzic		54 22	18 36
Bornholm		55 12	14 40
Strael Sound		54 24	13 10
Lubec		54 4	11 40
Anout		56 40	12 0
Leſon		57 4	11 9
Riga		57 0	25 10
Dogoret Lights		58 56	22 35
Koxcar Lights		59 43	25 43

Coaſt of Holland and Flanders.

	H.W.		
Scaw		57 38	10 20
Helighland		54 17	9 3
Bremen	6 0	53 30	9 0
Hamburgh	6 15	53 36	9 55
Embden	12 15	53 13	7 15
The Texel	7 30	53 5	4 43
Amſterdam	3 0	52 22	4 50
Antwerp	6 0	51 13	4 28
The Brill	1 30	51 55	4 2
Oſtend	12 0	51 13	3 1

The Weſtern Iſles.

Corvo		39 41 N	31 0 W
Florea		39 34	30 55
Fial		38 32	28 41
Tercera		38 39	27 6
St. George's		38 39	27 55
Pico, or Pic of Azores		38 30	28 20
St. Michael's		37 49	25 36
St. Mary's		37 0	25 6

Canary Iſlands.

Porto Sancto		32 58 N	16 28 W
Madeira Eaſt End		32 50	16 26
Funchal	12 0	32 38	17 5
Ditto Weſt End		32 30	17 26
Palma		28 37	17 45
Teneriff the Pic		28 13	16 23
Gomera		28 6	17 8
Fero, or Iſle of Fer		27 48	17 45
Canaria, N. E. Pt.		28 13	17 33
I. Fortune Ventura		28 14	14 26
ſeven others N. E. of this		28 5	

Cape de Verd Iſlands.

St. Anthony, N. E. Pt.	17	9N	24	48W
St. Vincent's, S. P.	16	45	24	59
St. Lucia, S. Pt.	16	40	24	35
St. Nicholas, E. P.	16	19	24	2
Iſle of Sel, S. Pt.	16	30	22	52
Bonaviſta, Engliſh Road	16	5	23	5
Iſle of May	15	10	23	5
Iſle of St. Jago, E. Pt.	14	54	23	26
Iſle of Brava	14	45	24	42

Bermudas, N. P.	32	35	63	28
Ditto, St. George's	32	25	63	40

Iſlands in the Weſt Indies.

	Lat.		Long.	
Barbadoes, N. End	13	22½	59	52W
South Pt. ditto	13	7	59	45
Eaſt Pt. ditto	13	12½	59	37
Bridge Town ditto	13	9½	59	51
Tobago, N. E. Pt.	11	21½	60	8½
Plymouth Town, ditto	11	10½	60	27
Sandy Pt. ditto	11	6	60	32½
Trinidada, N. E. Pt.	10	20	59	32
S. W. P. ditto	9	34	61	10
N. W. Pt. Bay de la Sierra	10	10	60	30
St. Lucia, N. Pt.	13	56	60	46
S. E. Pt. ditto	13	27	60	45
S. W. Pt. ditto	13	30	61	0
Martinico, N. W. Pt.	14	51	61	26½
Fort Royal, ditto	14	36	61	4
S. W. Pt. ditto, or Diamond Rock	14	24½	61	1
S. E. Pt. ditto, or Saline Pt.	14	24	60	57
Carvel Iſle	14	58½	61	2
Granada, N. Pt.	12	23	61	47½
S. W. Pt. ditto, or Salines Pt.	12	2	61	58
Fort Royal, ditto	12	6½	61	50
St. Vincent's, N. Pt.	13	12½	61	16
S. E. Pt. ditto	13	04	61	15
King's-Town, ditto	13	02	61	17½
Dominica, N. Pt.	15	39	61	26
South Pt. ditto	15	14	61	21
Point Mulatre	15	16	61	16
Roncau Town	15	18	61	20
Marigallante, N. End	16	4	61	3½
S. End ditto	15	50	61	7
Sable Point, ditto	15	59	61	9½
Guadaloupe, N. Pt.	16	40	61	44
S. W. Pt. or Baſſaterre	15	59	61	43½
Point Malendure, ditto	16	10½	61	52½
Point Sauveur	16	5N	61	47W
Engliſhman's Head, ditto	16	31	61	50
Deſeada, N. Pt.	16	24	60	56½
S. Pt. ditto	16	16	61	3
Petite Terre, I. ditto	16	14	60	59
Iſles des Saints, N. Pt.	15	59	61	25
S. Pt. ditto	15	54	61	29
Antigua, N. E. End	17	3	61	45
W. Pt.	17	3	61	57
N. Pt.	17	7	61	55
Grande Terre, N. Pt.	16	40	61	25
Pt. des Chateaux, dit.	16	14	61	4
Montſerat, N. Pt.	16	47	62	12
Redondo Iſle	16	54	62	16
Berbuda, N. Pt.	17	50	61	45
St. Euſtatia Iſle	17	29	62	57
Saba Iſle	17	39	63	8½
St. Chriſtopher's N. Pt.	17	35	62	42
S. Pt. ditto	17	24	62	31
Nevis	17	22	62	30
St. Bartholomew, E. Pt.	17	54	62	44
W. Pt. ditto	17	54	62	53
St. Martin's, N Pt.	18	9½	62	57
S. Pt. ditto	18	0	63	3
E. Pt. ditto	18	4	62	56
W. Pt. ditto	18	51	63	13
Anguilla, N. E. Pt.	18	21	62	54
S. W. End ditto	18	13	63	15
Hat Iſle	18	38	63	26
Avis, ſmall Iſle	15	20	63	35
Anegada, S. E. Pt.	18	36	64	0
W. Pt. ditto	18	42	64	23
Virgin's Gorda Fort	18	18	64	13
N. Pt. ditto	18	26	64	10
S. E. Pt. ditto	18	15	63	59
St. Croix, E. Pt.	17	51	64	30
W. Pt. ditto	17	53	64	51
Tortola Iſle, W. Pt.	18	17	64	39
E. Pt. ditto	18	18	64	24
St. John's, S. Pt.	18	4	64	46
St. Thomas's, the Town	18	22	64	46
N. E. Pt. ditto	18	26	64	41
Crab Iſle, E. Pt.	18	5	65	18
Porto Rico, S. E. Pt.	18	9	65	44
N. E. Pt. ditto	18	39	65	38
Fort St. Antonio	18	38	66	25
Cape Rincon	18	40	67	48
Cape Roxo	18	11	67	48
Mona Iſle	18	10	68	23
Teſtigos Iſland	11	6	61	43
Margarita, N. Pt.	11	7	62	40
N. W. Pt. ditto	11	3	63	20
S. W. Pt. ditto	10	47	63	20
Blanca Iſle, N. Pt.	11	44	63	36
Salada Iſle, N. E. Pt.	10	59	64	7
Orchilla Iſle, N. E. Pt.	11	51	65	2
Rock Iſles, Middle	11	50	65	50
Bonair, S. E. Pt.	11	59	67	32
N. W. Pt. ditto	12	22	67	50
Ya Grande, middle	11	55	66	55
Curacoa, N. Pt.	12	33	68	45
S. E. Pt. ditto	11	53	68	16

The Variation ſet down in theſe Tables is for 1784.

	Lat.	Long.
Hiſpaniola		
Cape Enganno	18 27	68 46W
Old Cape Francois	19 40	69 56
New Cape Francois	19 46	72 13
Cape Nicolas	19 45	73 24
Cape Donna Maria	18 37	74 22
Cape Tiburon	18 15	74 21
Port au Prince	18 42	72 12
Petit Grove	18 27	72 50
Saona Iſland, E. End off ditto	17 53	68 56
Baco Pt.	17 53	73 31
Altavala Iſland off ditto	17 23	71 35
Jamaica, E. Pt.	17 58	75 38
W. Pt. ditto	18 17	78 31
Kingſton	18 4	76 40
Morant Keys off ditto	17 35	75 35
Pedra Shoals E. Pt.	17 20	77 4
W. Pt. ditto	17 30	79 12
The New Bear Rocks, ſix fathom	16 20	78 50
The Bugles	15 40	78 15
Serranella, middle	16 10	80 40
Rocks above Water	15 20	79 20
Pearl Iſland	14 53	79 8
Swan's Iſland	17 20	84 0
A Dry Bank	18 38	83 15
Parcel's Shoals S. E. Pt.	15 0	80 15
Great Cayman, middle	19 20	81 05
Little Cayman	19 40	80 8
Old Providence, middle	13 35	80 45
Andre's Iſlands, middle	12 30	80 55
Cuba, E. End Cape Maze	20 18	74 5
S. W. End, ditto	21 49	85 15
Cape Cruwz	19 42	77 52
Iſle of Pines S. W. End ditto	21 30	83 20
Havannah	23 12	82 12
Eaſt Reef, off Hiſpaniola	20 27	68 54
North Reef ditto, E. Pt.	20 33	69 7
Triangle	20 51	69 48
Square Handkerchief, N. Pt.	21 24	70 14
S. Pt. ditto	21 5	70 44
Salt Key	21 30	70 58
Caycos, Iſles, N. Pt.	22 15	71 45
S. Pt. ditto	21 12	71 37
Heneaga, N. E. Pt.	21 35	72 56
S. W. Pt. ditto	21 12	73 32
Little Heneaga, N. Pt.	21 55	72 51
Mayaguanna, N. Pt.	22 51	72 52
French Keys	22 52	73 27
Acklin's Keys, S. Point	22 26	73 55
Hogſtie's Middle	21 45	73 46
South Key	22 21	74 1
Crooked Iſland	23 10	73 50
Atwood's Keys, E. Pt.	23 27	73 26
Long Iſland, N. Pt.	23 37	74 46
S. Pt. ditto	22 48	74 22
Key Verde	22 [illegible]	75 10
The Brothers, middle	22 44	75 0

	Lat.	Long.
Rum Key	23 52	74 12W
Watland Iſland, S. Pt.	24 0	73 55
Cat Iſles, N. Pt.	24 36	75 10
S. Pt. ditto	24 3	74 43
Eleuthera, S. Pt.	24 45	76 12
N. Pt. ditto	25 44	76 40
Green Key, S. Pt.	25 17	77 4
N. Providence, E. Pt.	24 58	77 17
Andros Iſle, N. Pt.	25 17	78 24
S. Pt. ditto	24 0	78 0
Berry's Iſlands, N. Pt.	25 52	78 25
S. Pt. ditto	25 21	78 3
Anguilla Bank, S. Pt.	23 22	78 42
Double Head Shot Keys N. W. Pt.	24 8	80 3
Orang's Key, S. Pt.	24 28	79 32
Cat Key, N. Pt.	25 14	79 35
Great Iſaac, N. Pt.	26 3	79 38
Little ditto	26 8	79 8
Hole in the Wall, S. E. Pt	26 5	77 40
Abbaco Key	27 0	77 48
Maranella, Reef, N. Pt.	27 45	79 43
Memory Rocks	27 20	79 35

The Latitudes and Longitudes of the Coaſt of the Continent of America, from Baffin's Bay to Cape Horn.

Cape Farewell	59 38N	42 40W
James Iſland, Baffin's Bay	71 40	57 30
Cape Bay, Dudley's, or Diggs's Cape	76 48	59 7
Ditto Hacluit Iſland off ditto	77 25	62 0
Alderman Jones's Sound, ditto	77 30	89 0
James Lancaſter's Sound, ditto	74 10	90 0
Cumberland Iſland	68 0	62 30
Cape Elizabeth	62 35	64 0

Hudſon's Bay and Straits.

Cape Reſolution	7 0	61 30W	65 16W
Button's Iſles	10 0	60 47	65 16
Lowe's Savage Iſland	9 0	61 48	6[illegible] 20
Terra Nieva	10 0	62 4	68 0
Saddle Back Iſland	10 0	62 10	68 10
Great Bear Iſland	12 0	54 4	79 56
Ice Cove	10 0	62 0	69 0
Baker's Dozen	11 0	57 0	
Great Savage Iſland	10 0	62 25	70 0
North Bluff	10 0	62 26	71 10
God's Mercies	10 0	62 28	70 48
Saliſbury Iſland	11 0	63 30	76 50
Nottingham, E. End	11 0	63 35	76 45
Cape Charles, E. End	11 0	62 50	74 15
Ditto, W. End	11 0	62 40	76 0
Burgeo Iſles 23° W. Var.		47 36	57 36

	H.W.		Lat.		Long.	
Cape Walſingham	12	0	62	40	78	0
Cape Diggs	12	0	62	45	78	48
Mansfield, N. End	12	0	62	40	78	0
Ditto S. End	12	0	61	35	81	30
Sleeper's Iſland			60	10	81	30
Great ditto			58	35		
Cape Pembroke	12	0	62	57	82	10
Large Swan's Neſt	12	0	62	20	83	30
Cape Southampton	12	0	62	10	86	10
Churchill River	7	0	58	47	94	7
Charlton Iſle			52	3	79	5
Port Nelſon Shoals	7	0	57	35	92	30
Hay River	7	0	57	10	93	0

Newfoundland.

	H.W.		Lat.		Long.	
Belle Iſle, N. Pt.			51	57	55	35W
S. Pt. ditto			51	48	55	35
Quirpon Harbour &			51	40	55	32
Cape Norman	9	0	51	39	55	58
Anchor Pt. Var. 24 30 W	9	0	51	15	56	47
Point Feroll			51	4	57	6
St. John's Iſland	1	0	50	50	57	20
Point Rich			50	40	57	25
Point Sable			50	24	57	30
Cow Head			49	53	57	50
St. Paul's Bay			49	50	57	50
Cape St. Gregory, Var. 22° 40′W.			49	23	58	13
Bay of Iſlands N. Head			49	16	58	13
S. Head			49	6	58	24
Red Iſland			48	34	59	11
Cape St. George, Var. 19°W.			48	28	59	7
Cape Anguille			47	54	59	17
Cape Ray, Var. 20 0W.			47	37	59	10
Burgeo			47	33	57	36
Pinguin's Iſland			47	22	56	57
Brunett Iſland, Fortune Bay			47	10	55	55
Boxey Pt. ditto			47	36	55	35
Fortune Head, 18° 30 W. Var.			47	6	55	45
Cape Miquilon			47	3	56	13
S. Pt. ditto			46	34	56	3
Point May			46	54	55	57
Point Gaules			46	47	55	40
Chapeau Rouge, or Red Hat			46	51	55	21
Mortir's Rocks, off ditto			47	0	54	50
Placentia Bay			47	0	55	8
Cape St. Mary's			46	52	54	3
St. Mary's Keys			46	45	54	3
Cape Engliſh			46	49	58	24
Cape Pine			46	42	53	15
Cape Race			46	43	52	44
Cape Ballard			46	49	52	35
Black Head			47	3	52	33
Cape Broyle			47	7	52	31
Bay of Bulls			47	20	52	24
Cape Spear			47	33	52	15
Cape St. Frances			47	54	52	25
Belliſle, Conception Bay			47	43	52	47
Baccolao Iſland			48	24	52	29
Point Graces			48	24	52	34
Trinity Harbour			48	38	53	0
Cape Bonaviſta			47	43	52	33
Inner Gooſberry Iſland			49	15	53	0
Stinking Iſlands			49	28	52	45
Cape Freels			49	55	52	55
Funk Iſland			50	0	52	10
Dureto Lodge			50	10	52	40
Wadham Iſlands			49	57	53	32
Cromwell's Lodge			50	12	53	25
Cape Fogo, on Iſlan. Fogo			49	57	53	42
Rocks off ditto			50	10	53	45
Twelingate Iſlands			59	2	54	36
Cape St. John			50	10	55	32
Horſe Iſlands			50	23	55	46
Cape Partridge, White's Bay			50	17	56	10
Orange Bay			50	34	56	22
Green Iſland			50	46	55	40
Ditto, N. Pt.			51	0	55	37
Hooping Harbour			51	56	56	10
Crouch Harbour			50	56	55	54
Croque Harbour			51	5	55	52
St. Anthony's Cape, Hare Bay			51	17	55	38

Coaſt of Labradore.

	H.W.		Lat.		Long.	
York Point			51	57	55	50
Fortune Bay			51	28	56	55
Grands Point			51	24	57	11
Old Fort Iſlands, Eſquimaux Bay			51	24	57	43
Great Mecatina, Pt.			50	42	59	8
Little ditto Iſland			50	36	59	26
Mary's Iſland			50	16	59	45
Waſkemaſhin Iſland			50	3	59	50
Mount Iſle			50	5	61	30
Eſquimaux Iſlands			50	10	63	0
Anticoſti Iſlands, S. E Pt.			49	7	61	27
N. W. Pt.			49	48	64	8
Grande Bay			50	18	64	0
Seven Iſland Bay, Entrance			50	5	65	40
Bald Mountain			49	52	66	28
Engliſh Harbour			49	29	66	55
Hare Iſland, N. Pt.			48	3	68	33
Mount Camile			48	41	67	13
Cape Cat			49	4	66	13
Magdalen River			49	13	65	17
Cape Roſiers			48	56	63	35
Gaſpey Bay			48	46	63	31
Bonaventura Iſland			48	33	63	27
Cape Ann			48	29	63	38

	H. W.		Lat. N		Long. W	
Miſco Iſland, Entrance, Chaleur Bay			48	8	64	16
Magdalen Iſland, N. W. Point			47	35	60	54
S. W. Point			47	15	61	54
Croſs Iſland, W. Point			47	46	61	0
Bird's Rocks			47	43	60	30
Iſland St. John's, N. Cape			47	8	64	5
E. Pt. ditto			46	28	62	0
Cape St. Lowis			46	0	61	48
St. Paul's Iſland			47	13	59	57
Cape Breton, N. C.			47	7	60	8
Mira Bay			46	5	59	44
Scatari Iſland			46	3	59	30
Sunk Rock, off Cape Breton			45	51	59	24
Cape Breton			45	54	59	39
Louiſbourg			45	54	59	49
Cape Canſo, Var. 15° 15	8	30	45	16	60	50
Iſland Sable, E. Pt. Var. 15°	8	30	44	8	59	55
W. Pt. ditto			44	4	60	30
Sandwich Bay, Var. 14 10	9	0	45	8	61	35
Cape Southampton, 13 53	10	0	44	46	62	13
Hallifax Harbour, W. 14 0 Var.	8	0	44	36	63	23
Cape Sambro, Light Houſe, 13° 35 V.	8	0	44	30	63	27
Charlotte Bay 13 30 Var.	8	6	44	34	63	50
Port Campbell, or Roſway 12 42	8	¼	43	40	65	12
Cape Sable 11 15	8	0	43	26	65	31
Seal Iſland 11 0	8	¾	43	26	65	55
Cape Taboque 11 45	9	0	43	48	66	1
Cape Mary	9	0	44	10	66	7
Breyer Iſland, Var. 11 15 W.	9	½	44	19	66	20
Trinity Ledge	9	0	44	5	66	14
Anapolis Royal 11 15	10	0	44	47	65	43
Cape Chegnacto 13 40	11	0	45	25	64	46
River St. John's Fundy's Bay			45	20	66	0
Mount Deſart Rock			44	3	67	50
Caſhe's Ledge			43	1	68	45
Cape Ann Lighthouſe	10	0	42	51	70	4
Boſton	10	0	42	25	70	31
Cape Cod			42	5	69	40
Nantucket Shoals	9	0	40	10	68	55
Ditto Iſlands			41	14	69	23
Noman's Land			41	18	70	26
Grey Head			41	23	70	30
Rhode Iſland Harb.			41	25	71	15
Judith Point			41	17	71	28
Block Iſland Middle			40	57	71	37

	H.W.		Lat.		Long. W	
Montick Point, Long Iſland			40	50N	71	57
Sandy Hook			40	25	74	0
New York	3	0	40	43	74	5
Cape May	8	¼	38	58	74	51
Philadelphia			39	57	75	7
Cape Henlopen			38	46	75	4
Falſe Cape			38	38	75	2
Cape Charles			37	9	75	50
Cape Henry 5°15'W	11	0	36	57	75	51
Cape Hatteras Var. 4° 20' W.	11	0	35	6	75	46
Shoals off ditto, S. Pt.			34	45	76	28
Cape Lookout	10	0	34	22	76	44
Shoals off ditto, S. Pt.			34	10	76	40
Cape Fear			33	51	78	20
Frying Pan Shoals, S. E. Pt.			33	39	78	17
Great Town Entrance			33	18	79	30
Cape Roman			33	5	79	52
Charles Town Light Houſe	7	0	33	42	80	40
Port Royal	7	0	32	6	81	14
Savannah Sound			31	57	81	19
St. Catherine's Iſland			31	36	81	36
St. Auguſtine, 6° E. Var.			29	50	82	21
Cape Canaverel Sho. 2° E. Var.			28	20	80	46
Cape Florida, 6° 30' E.			25	44	80	32
Dry Tortugas Shoals Var. 7° 40'E.			24	15	83	27
Cape Sable, in Florida, Var. 6° 0'E			24	57	81	44
Chatham Bay			25	43	82	15
Cape Roman			25	40	82	20
Charlotte Harbour, Florida, Var. 13° 30	8	0	26	40	82	32
Spiritu Sancto, Var. 5° 50 E.			28	0	83	30
Cape St. Blaz			29	44	85	30
Miſſiſipi River Mou.			28	55	89	15
River Bravo Mouth			26	0	97	40
Vera Cruz			19	10	95	5
St. Ann's			18	10	92	20
Campeachy			19	10	90	20
St. Piedras			21	4	90	30
Cape Catoche			21	26	88	13
Falſe Cape			20	55	85	50
Ratan Iſland, Bay of Honduras, E. Pt.			16	25	87	0
Bonacoa Iſland, ditto E. Pt.			16	36	86	20
Punta de San Blas			9	30	78	38
Porto Bello			9	32	79	44
Gulph of Darien			8	30	76	40
Carthagena			10	27	75	20

	Lat.	Long.
St. Martha	11 25N	74 4W
Roco Grande	11 5	7 34
Cape de la Vela	12 10	71 58
Cape Coque Bacoa	12 10	70 40
Aruba	12 10	69 40
Curacoa, W. Pt.	12 31	68 44
Bonair, N. Pt.	12 21	67 50
Cape de St. Roman	11 48	69 40
Cape Codras	10 52	65 32
Cape Three Points	10 38	61 52
River Oronooko Mouth	8 30	59 0
Eſſequibo	6 55	57 45
Surinam	6 10	54 45
Cayenne	5 15	52 0
Cape North	1 58	49 49

South America.

Iſland St. Juan	1 20S.	45 0
Mouth of River Omara	5 0	35 55
Fernando Loronho	3 48	30 50
Cape Roque	5 0	35 45
Cape St. Auguſtine	8 50	35 10
River St. Franciſco	10 55	36 40
Bay of Todor Sanctos	13 5	39 0
Port Segura	17 0	40 0
Spiritu Sancto	20 20	40 0
Cape Frio	22 54	42 38
Rio Janeiro	22 54	42 38
St. Catherine's	27 35	49 11
Cape Maria	35 0	55 8
Buenos Ayres, River Plate	34 35	51 55
Cape St Anthonio	36 30	45 40
Cape Mattas	45 5	64 20
Cape Blanco Patagonia	47 20	64 36
Port Deſire, to make it with Steeple Rock on the Side of it	47 0	64 0
Port St. Julian	49 10	68 40
Cape St. Juan	54 47	63 41
Falkland Iſlands	51 30	51 27
Cape Succeſs	51 1	35 30
Cape Virgin	52 23	67 40
Cape Diago	54 33	64 10
Straits Magellan Entrance	52 21	67 40
Cape Deſeada	55 4	74 12
Staten Iſland	55 0	72 35
Evot's Iſland	55 34	66 36
Cape Horn	55 58	67 20
Chriſtmas Sound	55 22	69 57
Barnvelt's Iſland, Terre de Fuego	55 49	66 58
York Minſter	55 26	70 2
Cape de los Pilares, Entrance of Magellan Straits	53 15	78 20
Conception Bay	36 43	72 34
Cape Roman	48 20	76 35
Juan Ferdinando's Iſland	32 3	73 43
Valparaiſo	33 1	72 13
Coquimbo	29 54	71 10
Yilo	17 36	71 7
Arica	18 27	71 5
Lima	12 1	76 40

	Lat.	Long.
Payta	5 0	79 40W
Cape Blanco Peru	3 48	88 40
Quito	13 0S.	77 50
Guiaquil	2 11S.	81 5
Panama	8 48 N	79 45
Acapulco	17 10 N	104 30
Point Mala, Coaſt of Paragua	7 35 N	80 45
Cape Blanco Nicaragua	9 18	85 45
Cape Corientes	19 45	110 0
Port Guatamala	14 0	92 35
Cape St Catherine	10 40	86 45
Amapalla	12 40	89 5
Cape Remedie, Coaſt of Guatamala	12 50	93 0
St. Thomas's Iſland	20 10	113 0

Coaſt of California.

Cape Conception	36 0	126 0
Cape Mendocin, diſcovered by Sir Francis Drake in the Year 1578, New Albion	42 20	130 0
Mouth of the River of the Weſt, diſcovered 1603, by M. d' Aquilar, ſaid to join Nelſon's River	44 30	131 0
Coaſt diſcovered by Captain Iſchirckow in 1741, and	55 60	137 0
B C Bering in 1741	60 0	140 0
St. Joſeph's	23 4	109 36
Cape Silias	59 10	146 30
Cape St. Hermogenies	58 45	154 20
Iſland St. Stephen, at the Mouth of the Sea Kamſchatka	50 45	180 25

Southern Iſlands in the Atlantic

St. Matthew's	1 23S.	6 10W
Aſcenſion	7 57	14 18
St. Helena	16 4	5 54
Fernandepo	3 2N	3 32
Princes	1 30	9 32
St. Thomas	0 0	7 0
Cape Podron	6 0S.	11 40
Annabona	1 26N	8 10
St. Phillip's	12 22S.	13 20
Triſtian de Cunha	37 10	13 30
Iſle de Picos	24 0	16 20
I. Martinwas	21 0	18 40
I. St. Maria	20 0	18 40
Iſle Trinidada	20 30	25 30
Iſle Aſcenſion	20 40	28 30
I. Fanando Noranha	3 56	32 35
I. Rocas	5 6	35 40
I. Sabaldes	50 53	50 35
Whitſunday Iſland	19 26	137 56
Queen Charlotte's Iſland	19 18	138 4
Egmount Iſland	19 20	138 30
Duke of Glouceſter's Iſland	19 11	140 6
Duke of Cumberland's Iſl.	19 18	140 34
Prince William Henry's Iſl.	19 9	141 6

	Lat.	Long.
King George III's I. or Otaheite S.E. end	17 48	149 15
King George III's I. or Otaheite N W end	17 30	152 0
Duke of York's Iſland	17 28	150 16
Sir Charles Saunders's Iſland	17 28	150 4
Lord Howe's Iſland	16 46	151 13
Scilly Iſland	16 28	174 30
Boſcawen's Iſland	15 50	175 10
Auguſtus Keppel's Iſland	15 53	175 13
Wallis's Iſland	13 18	177 0W
Adventure Bay, N. Holland	43 23	147 0W
Adventure I. S. Sea	17 9	144 18N
Ambrym I. ditto	16 9	168 12E
Amſterdam I. ditto	21 9	174 46W
Annamocka ditto	20 16	174 30W
Apac I. ditto	16 46	168 27E
Aurora I. ditto	15 8	168 17E
Bolſchereſkoi, Siberia	52 54N	156 37E
Briſtol Cape, Sandwich-Land	59 2	26 51W
Buller Cape, South Georgia	53 58	37 40
Candlemas I. Sandwich Land	57 10	27 13W
Charlotte Cape, S. Georgia	54 32	36 11W
Cape Coronation, N. Caledonia	22 5S.	167 8 E
Commin I. S. Sea	31 40N	8 4 F
Gunief, Siberia	47 7	51 57 E
Hinchinbroke I. S. Sea	17 25S.	168 30 E
Hood's I. ditto	9 26	138 52W
Jakutſkoi, Siberia	62 1N	129 47 E
I. of Pines, S. Sea	22 38S.	167 38 E
Port Madre de Dios Aſia, ditto	9 55	139 8W
Madalena, I.	10 25	138 49W
Maſkelyne, I. ditto	16 32	167 59 E
Montago, I. ditto	17 26	168 31 E
Norfolk, I. ditto	29 2N	168 10 E
Obevahoa I.	9 40S.	139 1W
Ohitahoo I.	9 55	139 6W
Onatiayo I.	9 58	138 51W
Oſnaburgh I.	17 52	148 6W
Huahimi I.	16 44	151 8W
Palliſer's I. ditto	15 38	146 30W
Palmerſton's I. ditto	18 0	162 57W
Paoom I. ditto	16 30	168 28 E
Portland I. ditto	39 25	178 12 E
Pyleſtaart's I. ditto	22 23	175 41W
New Hebrides, ditto	14 56	167 20 E
Sandwich I. ditto	17 40	168 33 E
Shepherd's I. ditto	16 58	168 42 E
Toankaa I. ditto	14 30	145 9W
Tobolſki, Siberia	58 12	168 13 E
Tonga Tabu I. S. Sea	21 9	174 49W

Coaſt of Siberia.

	Lat.	Long.
Cape Chiokotſkago	64 0	174 45W
Cape Chuckehenſo	66 30	171 10
Holy Cape	72 32	173 45 E
Hamchatka Lower	56 11	159 25
Hamchatka Upper	54 48	157 25 E
I. Kagrahenſkoy	58 0	162 10
Cape St. Thaudus	62 10	175 5

The Coaſt of Barbary and Guinea.

	Lat.	Long.
Cape Spartel	35 42N	5 50W
Larache	35 11	6 5
Sallee	34 5	6 38
Cape Blanc	33 4	8 20
Cape Cantin	32 37	8 50
Mogadore	31 27	9 25
Saphie	32 20	8 40
Cape de Gee	30 30	10 8
Cape Croix	30 38	9 50
Cape Nun	28 47	10 55
Cape Bojadore	26 30	14 21
Cape das Barbas	22 15	16 54
Cape Blanco	20 55	17 5
Senegal	15 53	16 36
Cape de Verd*	14 46	17 27
Shoals off Ditto, S. Point	14 46	19 26
——— N. Point	17 30	
River Gambia Entrance	13 28	16 15
Cape Rouge	12 15	16 20
R. de Sierra Leona Entr.	8 22	12 8
Cape Mount	6 38	9 44
Cape Mezurado	6 12	9 3
River Seſtos Entrance	5 30	7 42
Cape Palmas	4 18	5 25
R. St. Andrew Entrance	5 8	4 26
Cape la Ho	5 2	3 16
Cape three Points	4 32	0 5 E
River Volta	5 48	1 42
Road of Juda in the Gulph I. of Benin	6 10	5 58
R. Formoſa, or Benin En.	6 38	4 52
Benin Town	7 42	7 28
Cape Formoſa	4 32	8 15
New Calabar River Entr.	4 30	9 15
Old Calabar River Entr.	4 32	10 33
R. Cameron Entrance	4 0	11 24
Iſle Fernando Po	3 8	10 33
Prince's Iſle	1 30	9 32
St. Thomas's Iſle, N. P.	0 42	8 30
Cape St. John	1 11	10 38
River Gabon Entrance on the Equator	0 0	10 50
Cape Lopas Gonſalvo	0 50 S	10 23
Iſle Annabona	1 26	8 10
Cape St. Catherine	2 9	10 43
Majumba, or Alva Entrance of Bay	3 15	11 17
Cape Padron	5 55	12 58
The Town of Congo	6 6	13 30
Cape Ledo	9 30	13 10
Benguela	12 8	12 39
Cape Negro	16 2	11 15
Bay of Conception, or Gulph of St. Thomas Entrance	24 42	13 13
Cape Voltas	28 55	15 53
Bay of St. Helena, or St. Martin	31 42	17 33

The Coaſt of the Main Continent in the Eaſt Indies.

	Lat.		Long.	
Cape of Good Hope	34	29S.	18	29E.
Cape Hanglip	34	16	18	50
Fals Bay	34	10	18	50
Cape Falſe	34	16	18	39
Cape Laquillas	34	44	20	32
Cape Baſſas, or Baxas	34	26	22	30
Logoa Bay	33	25	25	45
River St. Chriſtopher's	32	47	27	38
Point Natal	31	50	27	38
St. John's River	31	45	33	15
Bay of Natal	29	25	33	10
River St. Lucia	28	20	30	50
C. Fumos	27	27	31	5
Algoa Bay, St. Mary's	25	48	31	10
River Manica	23	31	32	2
C. Corientes	24	0	34	50
C. St. Sebaſtian, Var. 25° W.	22	41	34	30
I. Bazarutto	21	55	34	35
Soſala	20	29	33	30
River Cuama	18	14	36	10
Angoſha, or Angoxa	16	30	38	40
Moſambique	15	18	40	53
St. Lazarus Bank	12	8	41	20
C. Delgada	10	10	41	12
Quiloa	8	40	39	58
Monſia Iſlands	7	36	40	45
Zenzibas Iſlands	6	55	40	10
Pemba Iſlands	4	32	40	45
Mombas	3	50	41	28
Melinda	2	53	42	15
B. Formoſa	2	30	42	30
R. Rouges	2	2	44	30
R. Magadoxa	1	57N	47	27
C. Das Baſſas	4	50	49	43
C. Orſui	10	25	52	10
C. Guardafoy	11	45	52	17
Aden	13	2	46	28
Straits of Babelmandel Entrance of the Red Sea	12	45	43	50
Mocho	13	19	44	15
C. Azab	12	42	42	28
I. Sabagar	15	0	42	33
C. Rat	11	45	41	2
Iſlands Dahlac	15	30	39	50
Suaken	19	33	36	10
Judda	21	29	39	26
Macca	20	35	40	0
C. Noſe	23	50	35	10
C. Caoſir	25	20	34	5
Mount Sinai	29	30	33	20
Suez	30	2	32	21
C. Fartaſh, or Fortauch N. E. Entrance of the Red Sea	15	30	52	30
Cape Morbat	16	45	55	30
Cape Raſalgate	22	16	60	5
Cape Marha	18	30	58	0
Maſkate	23	30	38	13
Cape Mozandum, or Muſeldom, Perſian Gulph Entrance	26	17	56	25
G. Ormus	27	5N	56	30E.
Gombaroon	27	15	56	12
I. Kiſhme	26	29	55	45
Congo	26	45	55	25
Iſland Cayen	26	30	54	0
Is. Samake	26	16	49	10
Is. Baharen	26	40	48	50
Kadhema	28	16	48	0
Baſſora, or Baſra	30	30	48	3
Cape Bardiſtan	28	0	52	5
Mouth R. Euphrates	30	49	48	30
Agra	26	43	76	49
Cape Nabon	27	36	51	58
Cape Jaſques	25	36	57	20
Cape Goadel	24	25	64	5
Cape Mohanzo	24	25	67	15
Kaſha	23	55	71	2
M. Indus R. Tatta	24	50	68	26
Giant's Point	22	10	68	24
Dui Point	20	40	69	45
G. Gambaya	22	20	71	27
Surat	21	10	72	25
Daman	20	20	72	6
Cape St. John	20	0	71	30
Bacain	19	32	72	0
Bombay	18	5	72	45
Rajapore	17	4	72	45
Caimſer's Bank	16	25	71	45
Coral Bank	16	0	71	45
Elizabeth Bank	16	59	71	5
Burnt Iſlands	15	50	73	35
Goa	15	31	73	50
Cape Rama	15	10	73	40
Carwave	14	55	73	54
Tellicherry	11	50	75	8
Mount Dilly	12	5	75	0
Callicut	11	21	75	33
Cochin	10	0	75	52
Cape Comorin	7	55	78	10
Manapar	8	30	78	12
Cape Calminera	10	15	79	45
Negapatnam	10	35	80	3
Pagodas	11	16	80	5
Trankbor	10	54	80	3
Fort St. David's	11	57	80	5
Pondicherry	11	46	79	57
Madraſs, St. George	13	5	80	34
Paliakate	13	30	79	55
Dui Head	16	10	81	45
Maſulipatanam	17	36	83	28
Chicakol	18	30	84	7
Ganjam	19	18	85	32
Balaſore	21	20	86	0
P. Palmiras Mouth of the Ganges.	20	50	87	30
Cape Kidgeree	21	48	88	55
Chandernagore	22	53	88	34
Iſlamabad	22	20	91	50
Hugley	23	56	88	34
Calcutta	22	34	88	35
St. Martin's Is.	20	0	91	45
Aracan R.	19	57	92	25
Chedula Is.	18	35	92	30
P. Negrais	16	9	92	30
Tavay River	13	30	96	45

	Lat.	Long.
Martaban Gulf	16 15N.	96 10E.
Marghi	11 59	97 15
Junkſelon	8 0	97 0
Pulo Pinang	5 30	98 45
Straits of Malacca	2 12	95 5
Malacca	2 15	102 5
Point Romania	1 17	104 26
G. of Siem	9 30	102 0
Cape Patina	7 1	100 30
Cham	12 45	100 30
Siam, or Judia,	14 18	100 53
C. Liam	12 30	100 1
Manſapa	12 20	101 30
Ponthimas	10 4	105 30
Cambodia Point	8 55	105 39
R. Cambodia's Mouth	19 30	107 15
	10 0	107 40
Cape St. James	10 32	108 7
Comorin Bay	11 50	110 10
Waſſen's Bay	12 15	110 15
Cape Avaralla	13 1	110 10
Banbom	14 55	108 30
Cape Touron	16 40	108 45
Paſſien Bay	26 35	10, 47
R. Tonquin	20 47	107 0
Surven Point	20 10	110 45
Canton	23 7	113 8
Ningpo	25 58	120 23
Hoai Neghan	33 35	118 56
Nankin	33 30	120 0
Singhangfu	34 16	108 50
Pekin	39 55	116 36
Straits of Bali, S. Entra.	8 39	114 30
———— N. Entra.	7 54	
Straits of Banca, W. Ent.	2 0	102 45
————, E. Entra.	3 0	103 43
Straits of Sunda, S. Entra.	5 58	103 5
Straits of Malacca, N. W. Entrance	6 15	94 45
Straits of Sincapore, or S. E. Entrance of the Malacca Straits	1 10	104 17
Straits of Sapi	8 34S.	119 45
Straits of Manilla	13 45N.	120 30
Parcellar Hill, Strait of Malacca, Var. 1 30 W.	3 15	101 2

The Tide flows N. N. E. and S. S. W. and the Flood runs E. S. E. and ebbs W. N. W.

Iſlands in the Eaſt Indies.

		Lat.	Long.
Dutch Bank		38 0S.	33 40E.
Amſterdam		38 30	74 0
St. Paul		37 52	77 55
New Holland, S. Point		37 15	147 30
Leuwin's Land ditto		35 0	130 0
Cape York ditto		11 15	141 0
Sandy Cape Weſt Point		25 30	171 0
George's Cape		35 15	151 0
Tryal's Rocks off ditto		19 0	105 2
Cape St Mary	I. Madagaſcar.	25 34	44 12
Star Bank		25 0	43 10
B. C. Auguſtine V. 24 W.		23 35	43 21
Cape St. Vincent V. 22 26 W.		21 30	43 03
Foul Pt.	Iſle Madagaſcar.	17 40S.	49 58E.
Cape St. Andrews, V. 21 50. W.		16 35	44 20
Cape St. Sebaſtian		12 30	46 29
Cape de Ambra, or Natal		12 15	49 15
B. de Antongill		16 0	49 08
Antavares		21 5	47 04
Matatanes		22 15	46 45
Cape Ramos		25 0	46 9
Baſſos d'India		22 30	40 46
Querimbo		12 22	40 50
A Rock		21 35	39 15
A Rock in		21 28	41 30
St. Chriſtopher's		17 19	42 18
Engliſh Bank		17 56	39 3
Iſle of Fire		17 20	32 15
St. Juan de Nova		17 5	41 20
Mayotta		13 0	45 30
Mohilla		12 20	43 50
Baſſas de Chagas		6 40	72 50
Joanna		12 18	44 50
Cocos Iſland		12 30	96 0
Comora		11 30	48 53
Glorioſa		12 44	47 30
Apalioria		19 59	85 0
Bank of Patrom		5 3	62 45
De Gama		2 20	74 15
Juan de Nova		9 58	51 0
Padro de Banhas		5 39	50 45
St. Franciſco		6 21	53 0
Iſle Amarantes		5 27	48 45
Seven Brothers		3 25	60 30
Sea Cows		3 36	50 46
Three Brothers		3 45	62 30
Maſcarenhas		2 55	56 55
I. Seychelles H. W. 5 30		4 37	55 38
Carpo Santo		6 30	56 44
Diego Rais		0 45	70 25
Padro Banhos		6 50	70 25
Little Comoro		10 10	44 15
Diego Garſcia		7 42	75 3
Caudu		5 55	73 30
St. Brandon		16 38	62 55
Rodrique		19 41	63 17
Bourbon, St. Dennis		20 52	55 35
Mauritus		20 10	57 32
Cocos Iſland		12 20	96 5
Chriſtmas Iſle		10 45	104 30
Naſſaw		3 0	100 25
Iſle Good Fortune		1 30	90 30
Minta		0 26	98 5
Engona		5 15	102 45
N. Part	Sumatra.	6 0	94 35
Acham, or Acheen		5 20	95 35
Point Baſſe		5 27	94 45
Diamond Point		5 17	97 5
Bencoolen		3 49	102 4
South Point		6 2	104 16
R. Palambam		3 2	104 45
Banca, S. End		3 15	107 10
N. Weſt End		1 50	105 30
Prince's Iſles Straits of Sundy		5 30	103 30
Middle Iſle ditto		5 57	104 40

		Lat.	Long.
Java Head	Java	6 49N	106 55E.
Bantam Ditto		6 0	105 49
Batavia		6 12	106 43
Cape Sandana		7 42	114 30
E. Point		8 42	114 37
Lombok		8 30	116 30
Cumbava		9 28	118 20
Rotto		11 25	123 45
Timor, N. E.		9 0	128 0
Weſt Point		10 30	122 55
Timorland, N. Point		9 0	123 12
New Guinea			
Cape Deliverance ditto		11 30	157 55
Cape of Good Hope ditto			
Weſt Point ditto		1 32	131 40
New Britain, N. Point		1 30	148 10
South Point		6 55	149 0
Ceram Eaſt Point		3 56	131 15
W. Point		3 36	127 46
Boero, or Burro		3 30	126 20
Providence Is.		0 20	135 0
Gilola, S. Point		0 20	145 0
N. Point		1 15N.	145 0
N. E. Point	Celebes	1 15	124 37
N. W. Point		1 40	120 50
W. Point		4 5S.	117 55
S. W. Point		4 40	119 5
S. Point		5 56	119 55
S. E. Point		5 0	121 40
Macaſſar		5 10	119 7
E. Point	Borneo	1 2N.	118 30
W. Point		0 0	108 57
N. Point		7 5	117 20
S. Point		4 15S.	114 30
Balambangan		7 19	117 12
Socrata, E. Point		11 59N.	55 7
W. Point		12 25	54 12
I. Halabi		16 50	56 52
Abdelour		11 55	53 45
Lakedivas Is. N. Point		13 33	70 3
E. Part		10 3	71 30
Maldevas Limits		8 30 1 30	74 30 76 30
Point de Gale		6 15	80 20
Infanapatnum	Ceylon	9 47	80 55
N. Part		9 45	80 20
Trincomalay		8 32	81 40
E. End		7 30	82 15
W. End		6 15	80 20
I. Cocos		14 30	92 10
Great Andaman		14 0 11 45	92 0
Little Andaman		10 30	92 3
Cor. Nicobar		9 12	92 32
Nicovari		8 3	93 45
Nicobar		7 22	92 45
Puloway		5 55	95 2
Pulo Paſſang		5 52	104 30
Pulo Timon		2 45N.	104 30E
Pulo Aroe		3 0	105 0
Anamba		2 58	106 45
Natuna		4 0	108 38
Goat Is.		13 55	120 7
Pulo Condor		8 40	107 25
Banguay		7 12	117 35
Pulo Sapata		9 54	109 57
Paragua, S. Point		8 12	117 50
I. Negros, S. Point		9 15	120 20
——— N. Point		11 20	
N. Point		9 40	126 45
Panguel Bay	Mindanas.	7 55	124 30
S. E. Point		6 40	127 30
Mindanas			123 0
S. W. Point		6 45	122 2
Cape Auguſtine		6 30	126 0
S. Point		5 45	122 45
Mindora S. Point		12 0	121 30
N. W. Point		13 30	119 15
Panay, S. Point		10 33	122 4
N. Point		11 42	120 0
N. Point	Luconia	13 45	120 20
Manilla		14 30	120 20
N. Point		19 0	121 25
C. Baxeadore ditto		18 44	120 40
Diamond Iſle		15 42	193 15
South Point	Formosa	21 45	121 36
N. Point		25 15	121 45
N. E. Point		25 15	122 15
Man-han		23 30	121 15
Hainan, S. Point		18 22	109 30
N. E. Point		19 55	111 10
Van Cheau		18 50	110 45
Paracles Is. S. Part		11 45	110 45
N. Part		16 30	111 45
Macao		22 14	113 50
Leykeyo, N. Part		28 0	128 10
S. Part		25 30	128 30
Cummin		31 40	121 4
Homdo, S. Point	Japan	32 20	129 54
Nanagacqui		32 30	128 50
Dos Cavalhos		32 32	129 53
N. Part Cape Sugar		40 20	140 25
Cape Nebo		39 15	142 5
Peſcadores Is. S. End		11 0	167 30
N. Part		11 20	167 0
The Triangles, N. Part		17 5	112 4
Woody Iſland		1 46	106 10
The Elephant and Camel		9 2	113 3
Andradas Rock		9 51	110 50
Victory Iſland		1 43	106 48
Pulo Runda		6 0	95 30
Foul Iſland		18 6	92 23
Macclesfield Shoal		15 0	114 20
Pulo Pera		6 10	97 46
Three Brothers		10 32	108 4

A Table of Meridional Parts.

M.	od.	1d.	2d.	3d.	4d.	5d.	6d.	7d.	8d.	9d.	10d	11d	12d	13d	M.
0	0	60	120	180	240	300	361	421	482	542	603	664	725	787	0
1	1	61	121	181	241	301	362	422	483	543	604	665	726	788	1
2	2	62	122	182	242	302	363	423	484	544	605	666	727	789	2
3	3	63	123	183	243	303	364	424	485	545	606	667	728	790	3
4	4	64	124	184	244	304	365	425	486	546	607	668	729	791	4
5	5	65	125	185	245	305	366	426	487	547	608	669	730	792	5
6	6	66	126	186	246	306	367	427	488	548	609	670	731	793	6
7	7	67	127	187	247	307	368	428	489	549	610	671	732	794	7
8	8	68	128	188	248	308	369	429	490	550	611	672	733	795	8
9	9	69	129	189	249	309	370	430	491	551	612	673	735	796	9
10	10	70	130	190	250	310	371	431	492	552	613	674	736	797	10
11	11	71	131	191	251	311	372	432	493	553	614	675	737	798	11
12	12	72	132	192	252	312	373	433	494	554	615	676	738	799	12
13	13	73	133	193	253	313	374	434	495	555	616	677	739	800	13
14	14	74	134	194	254	314	375	435	496	556	617	678	740	801	14
15	15	75	135	195	255	315	376	436	497	557	618	679	741	802	15
16	16	76	136	196	256	316	377	437	498	558	619	680	742	803	16
17	17	77	137	197	257	317	378	438	499	559	620	681	743	804	17
18	18	78	138	198	258	318	379	439	500	560	621	682	744	805	18
19	19	79	139	199	259	319	380	440	501	561	622	683	745	806	19
20	20	80	140	200	260	320	381	441	502	562	623	684	746	807	20
21	21	81	141	201	261	321	382	442	503	563	624	685	747	808	21
22	22	82	142	202	262	322	383	443	504	564	625	686	748	809	22
23	23	83	143	203	263	323	384	444	505	565	626	688	749	810	23
24	24	84	144	204	264	324	385	445	506	566	627	689	750	811	24
25	25	85	145	205	265	325	386	446	507	567	628	690	751	812	25
26	26	86	146	206	266	326	387	447	508	568	629	691	752	813	26
27	27	87	147	207	267	327	388	448	509	569	630	692	753	814	27
28	28	88	148	208	268	328	389	449	510	570	632	693	754	816	28
29	29	89	149	209	269	329	390	450	511	571	633	694	755	817	29
30	30	90	150	210	270	330	391	451	512	573	634	695	756	818	30
31	31	91	151	211	271	332	392	452	513	574	635	696	757	819	31
32	32	92	152	212	272	333	393	453	514	575	636	697	758	820	32
33	33	93	153	212	273	334	394	454	515	570	637	698	759	821	33
34	34	94	154	214	274	335	395	455	516	577	638	699	760	822	34
35	35	95	155	215	275	336	396	456	517	578	639	700	761	823	35
36	36	96	156	216	276	337	397	457	518	579	640	701	762	824	36
37	37	97	157	217	277	338	398	458	519	580	641	702	763	825	37
38	38	98	158	218	278	339	399	459	520	581	642	703	764	826	38
39	39	99	159	219	279	340	400	460	521	582	643	704	765	827	39
40	40	100	160	220	280	341	401	461	522	583	644	705	766	828	40
41	41	101	161	221	281	342	402	462	523	584	645	706	767	829	41
42	42	102	162	222	282	343	403	463	524	585	646	707	768	830	42
43	43	103	163	223	283	344	404	464	525	586	647	708	769	831	43
44	44	104	164	224	284	345	405	465	526	587	648	709	770	832	44
45	45	105	165	225	285	346	406	466	527	588	649	710	771	833	45
46	46	106	166	226	286	347	407	467	528	589	650	711	772	834	46
47	47	107	167	227	287	348	408	468	529	590	651	712	773	835	47
48	48	108	168	228	288	349	409	469	530	591	652	713	774	836	48
49	49	109	169	229	289	350	410	470	531	592	653	714	775	837	49
50	50	110	170	230	290	351	411	471	532	593	654	715	776	838	50
51	51	111	171	231	291	352	412	472	533	594	655	716	777	839	51
52	52	112	172	232	292	353	413	473	534	595	656	717	779	840	52
33	53	113	173	233	293	354	414	474	535	596	657	718	780	841	53
54	54	114	174	234	294	355	415	475	536	597	658	719	781	842	54
55	55	115	175	235	295	356	416	477	537	598	659	720	782	843	55
56	56	116	176	236	296	357	417	478	538	599	660	721	783	844	56
57	57	117	177	237	297	358	418	479	539	600	661	722	784	845	57
58	58	118	178	238	298	359	419	480	540	601	662	723	785	846	58
59	59	119	179	239	299	360	420	481	541	602	663	724	786	847	59

A Table of Meridional Parts.

M.	14d	15d	16d.	17d.	18d.	19d.	20d.	21d.	22d.	23d.	24d.	25d.	26d.	27d.	M.
0	848	910	973	1035	1098	1161	1225	1289	1354	1419	1484	1550	1616	1684	0
1	849	911	974	36	99	63	26	90	55	20	85	51	18	85	1
2	851	913	975	37	1100	64	27	91	56	21	86	52	19	86	2
3	852	914	976	38	01	65	28	92	57	22	87	53	20	87	3
4	853	915	977	39	02	66	29	93	58	23	88	54	21	88	4
5	854	916	978	41	03	67	30	94	59	24	90	56	22	89	5
6	855	917	979	42	05	68	32	96	60	25	91	57	23	90	6
7	856	918	980	43	06	69	33	97	61	26	92	58	24	91	7
8	857	919	981	44	07	70	34	98	62	27	93	59	25	93	8
9	858	920	982	45	08	71	35	99	63	28	94	60	26	94	9
10	859	921	983	1046	1109	1172	1236	1300	1364	1429	1495	1561	1628	1695	10
11	860	922	984	47	10	73	37	01	66	31	96	62	29	96	11
12	861	923	985	48	11	74	38	02	67	32	97	63	30	97	12
13	862	924	986	49	12	75	39	03	68	33	98	64	31	98	13
14	863	925	987	50	13	76	40	04	69	34	99	65	32	99	14
15	864	926	988	51	14	77	41	05	70	35	1500	67	33	1700	15
16	865	927	989	52	15	78	42	06	71	36	02	68	34	01	16
17	866	928	990	53	16	80	43	07	72	37	03	69	35	03	17
18	867	929	991	54	17	81	44	08	73	38	04	70	37	04	18
19	868	930	992	55	18	82	45	10	74	39	05	71	38	05	19
20	869	931	994	1056	1119	1183	1247	1311	1375	1440	1506	1572	1639	1706	20
21	870	932	995	57	20	84	48	12	76	41	07	73	40	07	21
22	871	933	996	58	21	85	49	13	77	43	08	74	41	08	22
23	872	934	997	59	22	86	50	14	79	44	09	75	42	09	23
24	873	935	998	60	23	87	51	15	80	45	10	77	43	10	24
25	874	936	999	61	25	88	52	16	81	46	11	78	44	12	25
26	875	937	1000	63	26	89	53	17	82	47	13	79	45	13	26
27	876	938	1001	64	27	90	54	18	83	48	14	80	47	14	27
28	877	939	1002	65	28	91	55	19	84	49	15	81	48	15	28
29	878	941	1003	66	29	92	56	20	85	50	16	82	49	16	29
30	879	942	1004	1067	1130	1193	1257	1321	1386	1451	1517	1583	1650	1717	30
31	880	943	05	68	31	94	58	22	87	52	18	84	51	18	31
32	881	944	06	69	32	95	59	24	88	53	19	85	52	20	32
33	883	945	07	70	33	96	60	25	89	55	20	86	53	21	33
34	884	946	08	71	34	97	61	26	90	56	21	88	54	22	34
35	885	947	09	72	35	99	62	27	92	57	22	89	56	23	35
36	886	948	10	73	36	1200	64	28	93	58	24	90	57	24	36
37	887	949	11	74	37	01	65	29	94	59	25	91	58	25	37
38	888	950	12	75	38	02	66	30	95	60	26	92	59	26	38
39	889	951	13	76	39	03	67	31	96	61	27	93	60	27	39
40	890	952	1014	1077	1140	1204	1268	1332	1397	1462	1528	1594	1661	1729	40
41	891	953	15	78	41	05	69	33	98	63	29	95	62	30	41
42	892	954	16	79	42	06	70	34	99	64	30	96	63	31	42
43	893	955	18	80	44	07	71	35	1400	65	31	98	64	32	43
44	894	956	19	81	45	08	72	36	01	67	32	99	66	33	44
45	895	957	20	82	46	09	73	38	02	68	33	1600	67	34	45
46	896	958	21	83	47	10	74	39	03	69	35	01	68	35	46
47	897	959	22	85	48	11	75	40	05	70	36	02	69	36	47
48	898	960	23	86	49	12	76	41	06	71	37	03	70	38	48
49	899	961	24	87	50	13	77	42	07	72	38	04	71	39	49
50	900	962	1025	1088	1151	1214	1278	1343	1408	1473	1539	1605	1672	1740	50
51	901	963	26	89	52	16	80	44	09	74	40	06	73	41	51
52	902	964	27	90	53	17	81	45	10	75	41	08	75	42	52
53	903	965	28	91	54	18	82	46	11	76	42	09	76	43	53
54	904	966	29	92	55	19	83	47	12	77	43	10	77	44	54
55	905	968	30	93	56	20	84	48	13	79	44	11	78	45	55
56	906	969	31	94	57	21	85	49	14	80	46	12	79	47	56
57	907	970	32	95	58	22	86	50	15	81	47	13	80	48	57
58	908	971	33	96	59	23	87	52	16	82	48	14	81	49	58
59	909	972	34	97	60	24	88	53	18	83	49	15	82	50	59

A Table of Meridional Parts.

M	28d.	29d.	30d.	31d.	32d.	33d.	34d.	35d.	36d.	37d.	38d.	39d.	40d.	41d.	M
0	1751	1819	1888	1958	2028	2100	2171	2244	2318	2393	2468	2545	2623	2702	0
1	52	21	90	59	30	01	73	45	19	94	70	46	24	03	1
2	53	22	91	60	31	02	74	47	20	95	71	48	25	04	2
3	55	23	92	62	32	03	75	48	22	96	72	49	27	06	3
4	56	24	93	63	34	04	76	49	23	98	73	50	28	07	4
5	57	25	94	64	35	05	78	50	24	99	75	51	29	08	5
6	58	26	95	65	36	07	79	52	25	2400	76	53	31	10	6
7	59	27	96	66	37	08	80	53	27	01	77	54	32	11	7
8	60	29	98	67	38	09	81	54	28	03	78	55	33	12	8
9	61	30	99	69	39	10	82	55	29	04	80	57	34	14	9
10	1762	1831	1900	1970	2040	2111	2184	2256	2330	2405	2481	2558	2636	2715	10
11	64	32	01	71	41	13	85	58	32	06	82	59	37	16	11
12	65	33	02	72	43	14	86	59	33	08	84	60	38	18	12
13	66	34	03	73	44	15	87	60	34	09	85	62	40	19	13
14	67	35	05	74	45	16	88	61	35	10	86	63	41	20	14
15	68	37	06	76	46	17	90	63	37	11	87	64	42	22	15
16	69	38	07	77	47	19	91	64	38	13	89	66	44	23	16
17	70	39	08	78	48	20	92	65	39	14	90	67	45	24	17
18	72	40	09	79	50	21	93	66	40	15	91	68	46	26	18
19	73	41	10	80	51	22	94	68	42	16	92	69	48	27	19
20	1774	1842	1911	1981	2052	2123	2196	2269	2343	2418	2494	2571	2649	2728	20
21	75	43	13	83	53	25	97	70	44	19	95	72	50	29	21
22	76	45	14	84	54	26	98	71	4	20	96	73	51	31	22
23	77	46	15	85	56	27	99	72	46	21	98	75	53	32	23
24	78	47	16	86	57	28	2200	74	48	23	99	76	54	33	84
25	80	48	17	87	58	29	02	75	49	24	2500	77	55	35	25
26	81	49	18	88	59	31	03	76	50	25	01	78	57	36	26
27	82	50	20	90	60	32	04	77	51	27	03	80	58	37	27
28	83	52	21	91	61	33	05	79	53	28	04	81	59	39	28
29	84	53	22	92	63	34	07	80	54	29	05	82	61	40	29
30	1785	1854	1923	1993	2064	2135	1208	2281	2355	2430	2506	2584	2662	2742	30
31	86	55	24	94	65	37	09	82	56	32	08	85	63	43	31
32	87	56	25	95	66	38	10	83	58	33	09	86	65	44	32
33	89	57	27	97	67	39	11	85	59	34	10	88	66	46	33
34	90	58	28	98	69	40	13	86	60	35	12	89	67	47	34
35	91	60	29	99	70	41	14	87	61	37	13	90	69	48	35
36	92	61	30	2000	71	43	15	88	63	38	14	91	70	50	36
37	93	62	31	01	72	44	16	90	64	39	15	93	71	51	37
38	94	63	32	02	73	45	17	91	65	40	17	94	73	52	38
39	96	64	34	04	75	46	19	92	66	42	18	95	74	54	39
40	1797	1865	1935	2005	2076	2147	2220	2293	2368	2443	2519	2597	2675	2755	40
41	98	66	36	06	77	49	21	95	69	44	21	98	76	56	41
42	99	68	37	07	78	50	22	96	70	45	22	99	78	58	42
43	1800	69	38	08	79	51	24	97	71	47	23	2601	79	59	43
44	01	70	39	10	80	52	25	98	73	48	24	02	80	60	44
45	02	71	41	11	82	53	26	99	74	49	26	03	81	62	45
46	03	72	42	12	83	55	27	2301	75	51	27	04	82	63	46
47	05	73	43	13	84	56	28	02	76	52	28	06	84	64	47
48	06	75	44	14	85	57	30	03	78	53	30	07	86	66	48
49	07	76	45	15	86	58	31	04	79	54	31	08	87	67	49
50	1808	1877	1946	2017	2088	2159	2232	2306	2380	2456	2532	2610	2688	2768	50
51	09	78	48	18	89	61	33	07	81	57	33	11	90	70	51
52	10	79	49	19	90	62	35	08	83	58	35	12	91	71	52
53	11	80	50	20	91	63	36	09	84	59	36	14	92	72	53
54	13	81	51	21	92	64	37	11	85	61	37	15	94	74	54
55	14	83	52	22	94	65	38	12	86	62	38	16	95	75	55
56	15	84	53	24	95	67	39	13	88	63	40	17	96	76	56
	16	85	55	25	96	68	41	14	89	64	41	19	98	78	57
	17	86	56	26	97	69	42	16	90	66	42	20	99	79	58
		87	57	27	98	70	43	17	91	67	44	21	2700	80	59

A Table of Meridional Parts.

M.	42d.	43d.	44d.	45d.	46d.	47d.	48d.	49d.	50d.	51d.	52d.	53d.	54d.	55d.	M.
0	2782	2863	2946	3030	3116	3203	3392	3382	3474	3569	3665	3764	3865	3968	0
1	83	64	47	31	17	04	93	84	76	70	67	65	66	70	1
2	84	66	49	33	18	06	95	85	78	72	68	67	68	71	2
3	86	67	50	34	20	07	96	87	79	74	70	69	70	73	3
4	87	69	51	36	21	09	98	88	81	75	72	70	71	75	4
5	88	70	53	37	23	10	99	90	82	77	73	72	73	77	5
6	90	71	54	38	24	12	3301	91	84	78	75	74	75	78	6
7	91	73	56	40	26	13	02	93	85	80	77	75	77	80	7
8	92	74	57	41	27	14	03	94	87	82	78	77	78	82	8
9	94	75	58	43	29	16	95	96	88	83	80	79	80	84	9
10	2795	2877	2960	3044	3130	3217	3306	3397	3490	3585	3681	3780	3882	3985	10
11	97	78	61	46	31	19	08	99	92	86	83	82	83	87	11
12	98	80	63	47	33	20	09	3400	93	88	85	84	85	89	12
13	99	81	64	48	34	22	11	02	95	90	86	85	87	91	13
14	2801	82	65	50	36	23	12	03	96	91	88	87	89	92	14
15	02	84	67	51	37	25	14	05	98	93	90	89	90	94	15
16	03	85	68	53	39	26	16	07	99	94	91	90	92	96	16
17	05	86	70	54	40	28	17	08	3501	96	93	92	94	98	17
18	06	88	71	55	42	29	19	10	03	98	95	94	95	99	18
19	07	89	72	57	43	31	20	11	04	99	96	95	97	4001	19
20	2809	2891	2974	3058	3144	3232	3322	3413	3506	3601	3698	3797	3899	4003	20
21	10	92	75	60	46	34	23	14	07	02	99	99	3901	05	21
22	11	93	76	61	47	35	25	16	09	04	3701	3800	02	06	22
23	13	95	78	63	49	37	26	17	10	06	03	02	04	08	23
24	14	96	79	64	50	38	28	19	12	07	04	04	06	10	24
25	15	97	81	65	52	40	29	20	14	09	06	06	07	12	25
26	17	99	82	67	53	41	31	22	15	10	08	07	09	14	26
27	18	2900	83	68	55	42	32	23	17	12	09	09	11	15	27
28	20	01	85	70	56	44	34	25	18	14	11	11	13	17	28
29	21	03	86	71	57	45	35	27	20	15	13	12	14	19	29
30	2822	2904	2988	3073	3159	3247	3337	3428	3521	3617	3714	3814	3916	4021	30
31	24	06	89	74	60	48	38	30	23	18	16	16	18	22	31
32	25	07	91	75	62	50	40	31	25	20	17	17	19	24	32
33	26	08	92	77	63	51	41	33	26	22	19	19	21	26	33
34	28	10	93	78	65	53	43	34	28	23	21	21	23	28	34
35	29	11	95	80	66	54	44	36	29	25	22	22	25	29	35
36	30	13	96	81	68	56	46	37	31	26	24	24	26	31	36
37	32	14	98	83	69	57	47	39	32	28	26	26	28	33	37
38	33	15	99	84	71	59	49	40	34	30	27	27	30	35	38
39	34	17	3000	85	72	60	50	42	36	31	29	29	32	37	39
40	2836	2918	3002	3087	3173	3262	3352	3443	3537	3633	3731	3831	3933	4038	40
41	37	19	03	88	75	63	53	45	39	34	32	32	35	40	41
42	39	21	05	90	76	65	55	47	40	36	34	34	37	42	42
43	40	22	06	91	78	66	36	48	42	38	36	36	38	44	43
44	41	24	07	93	79	68	58	50	43	39	37	38	40	45	44
45	43	25	09	94	81	69	59	51	45	41	39	39	42	47	45
46	44	26	10	95	82	71	61	53	47	43	41	41	44	49	46
47	45	28	12	97	84	72	62	54	48	44	42	43	45	51	47
48	47	29	13	98	85	74	64	56	50	46	44	44	47	52	48
49	48	31	14	3100	87	75	65	57	51	47	46	46	49	54	49
50	2849	2932	3016	3101	3188	3277	3367	3459	3553	3649	3747	3848	3951	4056	50
51	51	33	17	03	90	78	68	60	55	51	49	49	52	58	51
52	52	35	19	04	91	80	70	62	56	52	50	51	54	60	52
53	54	36	20	06	92	81	71	64	58	54	52	53	56	61	53
54	55	37	21	07	94	83	73	65	59	55	54	55	58	63	54
55	56	39	23	08	95	84	74	67	61	57	55	56	59	65	55
56	58	40	24	10	97	86	76	68	62	59	57	58	61	67	56
57	59	42	26	11	98	87	78	70	64	60	59	60	63	69	57
58	60	43	27	13	3200	89	79	71	66	62	60	61	64	70	58
59	62	44	28	14	01	90	81	73	67	64	62	63	66	72	59

A Table of Meridional Parts.

M	28d.	29d.	30d.	31d.	32d.	33d.	34d.	35d.	36d.	37d.	38d.	39d.	40d.	41d.	M
0	1751	1819	1888	1958	2028	2100	2171	2244	2318	2393	2468	2545	2623	2702	0
1	52	21	90	59	30	01	73	45	19	94	70	46	24	03	1
2	53	22	91	60	31	02	74	47	20	95	71	48	25	04	2
3	55	23	92	62	32	03	75	48	22	96	72	49	27	06	3
4	56	24	93	63	34	04	76	49	23	98	73	50	28	07	4
5	57	25	94	64	35	05	78	50	24	99	75	51	29	08	5
6	58	26	95	65	36	07	79	52	25	2400	76	53	31	10	6
7	59	27	96	66	37	08	80	53	27	01	77	54	32	11	7
8	60	29	98	67	38	09	81	54	28	03	78	55	33	12	8
9	61	30	99	69	39	10	82	55	29	04	80	57	34	14	9
10	1762	1831	1900	1970	2040	2111	2184	2256	2330	2405	2481	2558	2636	2715	10
11	64	32	01	71	41	13	85	58	32	06	82	59	37	16	11
12	65	33	02	72	43	14	86	59	33	08	84	60	38	18	12
13	66	34	03	73	44	15	87	60	34	09	85	62	40	19	13
14	67	35	05	74	45	16	88	61	35	10	86	63	41	20	14
15	68	37	06	76	46	17	90	63	37	11	87	64	42	22	15
16	69	38	07	77	47	19	91	64	38	13	89	66	44	23	16
17	70	39	08	78	48	20	92	65	39	14	90	67	45	24	17
18	72	40	09	79	50	21	93	66	40	15	91	68	46	26	18
19	73	41	10	80	51	22	94	68	42	16	92	69	48	27	19
20	1774	1842	1911	1981	2052	2123	2196	2269	2343	2418	2494	2571	2649	2728	20
21	75	43	13	83	53	25	97	70	44	19	95	72	50	29	21
22	76	45	14	84	54	26	98	71	4	20	96	73	51	31	22
23	77	46	15	85	56	27	99	72	46	21	98	75	53	32	23
24	78	47	16	86	57	28	2200	74	48	23	99	76	54	33	84
25	80	48	17	87	58	29	02	75	49	24	2500	77	55	35	25
26	81	49	18	88	59	31	03	76	50	25	01	78	57	36	26
27	82	50	20	90	60	32	04	77	51	27	03	80	58	37	27
28	83	52	21	91	61	33	05	79	53	28	04	81	59	39	28
29	84	53	22	92	63	34	07	80	54	29	05	82	61	40	29
30	1785	1854	1923	1993	2064	2135	1208	2281	2355	2430	2506	2584	2662	2742	30
31	86	55	24	94	65	37	09	82	56	32	08	85	63	43	31
32	87	56	25	95	66	38	10	83	58	33	09	86	65	44	32
33	89	57	27	97	67	39	11	85	59	34	10	88	66	46	33
34	90	58	28	98	69	40	13	86	60	35	12	89	67	47	34
35	91	60	29	99	70	41	14	87	61	37	13	90	69	48	35
36	92	61	30	2000	71	43	15	88	63	38	14	91	70	50	36
37	93	62	31	01	72	44	16	90	64	39	15	93	71	51	37
38	94	63	32	02	73	45	17	91	65	40	17	94	73	52	38
39	96	64	34	04	75	46	19	92	66	42	18	95	74	54	39
40	1797	1865	1935	2005	2076	2147	2220	2293	2368	2443	2519	2597	2675	2755	40
41	98	66	36	06	77	49	21	95	69	44	21	98	76	56	41
42	99	68	37	07	78	50	22	96	70	45	22	99	78	58	42
43	1800	69	38	08	79	51	24	97	71	47	23	2601	79	59	43
44	01	70	39	10	80	52	25	98	73	48	24	02	80	60	44
45	02	71	41	11	82	53	26	99	74	49	26	03	81	62	45
46	03	72	42	12	83	55	27	2301	75	51	27	04	82	63	46
47	05	73	43	13	84	56	28	02	76	52	28	06	84	64	47
48	06	75	44	14	85	57	30	03	78	53	30	07	86	66	48
49	07	76	45	15	86	58	31	04	79	54	31	08	87	67	49
50	1808	1877	1946	2017	2088	2159	2232	2306	2380	2456	2532	2610	2688	2768	50
51	09	78	48	18	89	61	33	07	81	57	33	11	90	70	51
52	10	79	49	19	90	62	35	08	83	58	35	12	91	71	52
53	11	80	50	20	91	63	36	09	84	59	36	14	92	72	53
54	13	81	51	21	92	64	37	11	85	61	37	15	94	74	54
55	14	83	52	22	94	65	38	12	86	62	38	16	95	75	55
56	15	84	53	24	95	67	39	13	88	63	40	17	96	76	56
57	16	85	55	25	96	68	41	14	89	64	41	19	98	78	57
58	17	86	56	26	97	69	42	16	90	66	42	20	99	79	58
59	18	87	57	27	98	70	43	17	91	67	44	21	2700	80	59

A Table of Meridional Parts.

M.	42d.	43d.	44d.	45d.	46d.	47d.	48d.	49d.	50d.	51d.	52d.	53d.	54d.	55d.	M.
0	2782	2863	2946	3030	3116	3203	3392	3382	3474	3569	3665	3764	3865	3968	0
1	83	64	47	31	17	04	93	84	76	70	67	65	66	70	1
2	84	66	49	33	18	06	95	85	78	72	68	67	68	71	2
3	86	67	50	34	20	07	96	87	79	74	70	69	70	73	3
4	87	69	51	36	21	09	98	88	81	75	72	70	71	75	4
5	88	70	53	37	23	10	99	90	82	77	73	72	73	77	5
6	90	71	54	38	24	12	3301	91	84	78	75	74	75	78	6
7	91	73	56	40	26	13	02	93	85	80	77	75	77	80	7
8	92	74	57	41	27	14	03	94	87	82	78	77	78	82	8
9	94	75	58	43	29	16	05	96	88	83	80	79	80	84	9
10	2795	2877	2960	3044	3130	3217	3306	3397	3490	3585	3681	3780	3882	3985	10
11	97	78	61	46	31	19	08	99	92	86	83	82	83	87	11
12	98	80	63	47	33	20	09	3400	93	88	85	84	85	89	12
13	99	81	64	48	34	22	11	02	95	90	86	85	87	91	13
14	2801	82	65	50	36	23	12	03	96	91	88	87	89	92	14
15	02	84	67	51	37	25	14	05	98	93	90	89	90	94	15
16	03	85	68	53	39	26	16	07	99	94	91	90	92	96	16
17	05	86	70	54	40	28	17	08	3501	96	93	92	94	98	17
18	06	88	71	55	42	29	19	10	03	98	95	94	95	99	18
19	07	89	72	57	43	31	20	11	04	99	96	95	97	4001	19
20	2809	2891	2974	3058	3144	3232	3322	3413	3506	3601	3698	3797	3899	4003	20
21	10	92	75	60	46	34	23	14	07	02	99	99	3901	05	21
22	11	93	76	61	47	35	25	16	09	04	3701	3800	02	06	22
23	13	95	78	63	49	37	26	17	10	06	03	02	04	08	23
24	14	96	79	64	50	38	28	19	12	07	04	04	06	10	24
25	15	97	81	65	52	40	29	20	14	09	06	06	07	12	25
26	17	99	82	67	53	41	31	22	15	10	08	07	09	14	26
27	18	2900	83	68	55	42	32	23	17	12	09	09	11	15	27
28	20	01	85	70	56	44	34	25	18	14	11	11	13	17	28
29	21	03	86	71	57	45	35	27	20	15	13	12	14	19	29
30	2822	2904	2988	3073	3159	3247	3337	3428	3521	3617	3714	3814	3916	4021	30
31	24	06	89	74	60	48	38	30	23	18	16	16	18	22	31
32	25	07	91	75	62	50	40	31	25	20	17	17	19	24	32
33	26	08	92	77	63	51	41	33	26	22	19	19	21	26	33
34	28	10	93	78	65	53	43	34	28	23	21	21	23	28	34
35	29	11	95	80	66	54	44	36	29	25	22	22	25	29	35
36	30	13	96	81	68	56	46	37	31	26	24	24	26	31	36
37	32	14	98	83	69	57	47	39	32	28	26	26	28	33	37
38	33	15	99	84	71	59	49	40	34	30	27	27	30	35	38
39	34	17	3000	85	72	60	50	42	36	31	29	29	32	37	39
40	2836	2918	3002	3087	3173	3262	3352	3443	3537	3633	3731	3831	3933	4038	40
41	37	19	03	88	75	63	53	45	39	34	32	32	35	40	41
42	39	21	05	90	76	65	55	47	40	36	34	34	37	42	42
43	40	22	06	91	78	66	36	48	42	38	36	36	38	44	43
44	41	24	07	93	79	68	58	50	43	39	37	38	40	45	44
45	43	25	09	94	81	69	59	51	45	41	39	39	42	47	45
46	44	26	10	95	82	71	61	53	47	43	41	41	44	49	46
47	45	28	12	97	84	72	62	54	48	44	42	43	45	51	47
48	47	29	13	98	85	74	64	56	50	46	44	44	47	52	48
49	48	31	14	3100	87	75	65	57	51	47	46	46	49	54	49
50	2849	2932	3016	3101	3188	3277	3367	3459	3553	3649	3747	3848	3951	4056	50
51	51	33	17	03	90	78	68	60	55	51	49	49	52	58	51
52	52	35	19	04	91	80	70	62	56	52	50	51	54	60	52
53	54	36	20	06	92	81	71	64	58	54	52	53	56	61	53
54	55	37	21	07	94	83	73	65	59	55	54	55	58	63	54
55	56	39	23	08	95	84	74	67	61	57	55	56	59	65	55
56	58	40	24	10	97	86	76	68	62	59	57	58	61	67	56
57	59	42	26	11	98	87	78	70	64	60	59	60	63	69	57
58	60	43	27	13	3200	89	79	71	66	62	60	61	64	70	58
59	62	44	28	14	01	90	81	73	67	64	62	63	66	72	59

A Table of Meridional Parts.

M.	56d.	57d.	58d.	59d.	60d.	61d.	62d.	63d.	64d.	65d.	66d.	67d.	68d.	69d.	M.
0	4074	4183	4294	4409	4527	4649	4775	4905	5039	5179	5324	5474	5631	5795	0
1	76	84	96	11	29	51	77	07	42	81	26	77	33	97	1
2	78	86	98	13	31	53	79	09	44	84	28	79	36	5800	2
3	79	88	4300	15	33	55	81	12	46	86	31	82	39	03	3
4	81	90	02	17	35	57	84	14	49	88	33	84	41	06	4
5	83	92	04	19	37	60	86	16	51	91	36	87	44	09	5
6	85	94	06	21	39	62	88	18	53	93	38	89	47	11	6
7	86	95	08	23	41	64	90	20	55	95	41	92	50	14	7
8	88	97	09	25	43	66	92	23	58	98	43	95	52	17	8
9	90	99	11	27	45	68	94	25	60	5200	46	97	55	20	9
10	4092	4201	4313	4429	4547	4670	4796	4927	5062	5203	5348	5500	5658	5823	10
11	94	03	15	31	49	72	98	29	65	05	51	02	60	25	11
12	95	05	17	33	51	74	4801	31	67	07	53	05	63	28	12
13	97	07	19	34	53	76	03	34	69	10	56	07	66	31	13
14	99	08	21	36	55	78	05	36	71	12	58	10	68	34	14
15	4101	10	23	38	57	80	07	38	74	14	61	13	71	37	15
16	03	12	25	40	59	82	09	40	76	17	63	15	74	39	16
17	04	14	27	42	61	84	11	43	78	19	66	18	76	42	17
18	06	16	28	44	64	87	14	45	81	22	68	20	79	45	18
19	08	18	30	46	66	89	16	47	83	24	71	23	82	48	19
20	4110	4220	4332	4448	4568	4691	4818	4949	5085	5226	5373	5526	5685	5851	20
21	12	21	34	50	70	93	20	51	88	29	76	28	87	54	21
22	13	23	36	52	72	95	22	54	90	31	78	31	90	56	22
23	15	25	38	54	74	97	24	56	92	34	80	33	93	59	23
24	17	27	40	56	76	99	26	58	95	36	83	36	95	62	24
25	19	29	42	58	78	4701	29	60	97	38	85	39	98	65	25
26	21	31	44	60	80	03	31	63	99	41	88	41	5701	68	26
27	22	32	46	62	82	05	33	65	5102	43	90	44	04	71	27
28	24	34	47	64	84	07	35	67	04	46	93	46	06	74	28
29	26	36	49	66	86	10	37	69	06	48	95	49	09	76	29
30	4128	4238	4351	4468	4588	4712	4839	4972	5108	5250	5398	5552	5712	5879	30
31	30	40	53	70	90	14	42	73	11	53	5401	54	15	82	31
32	32	42	55	72	92	16	44	76	13	55	03	57	17	85	32
33	33	44	57	74	94	18	46	78	15	58	06	59	20	88	33
34	35	46	59	76	96	20	48	81	18	60	08	62	23	91	34
35	37	47	61	78	98	22	50	83	20	63	11	65	25	94	35
36	39	49	63	80	4600	24	52	85	22	65	13	67	28	96	36
37	41	51	65	82	02	26	55	87	25	67	16	70	31	99	37
38	42	53	67	84	04	28	57	90	27	70	18	73	34	5902	38
39	44	55	69	86	06	31	59	92	30	72	21	75	36	05	39
40	4146	4257	4370	4488	4608	4733	4861	4994	5132	5275	5423	5578	5739	5908	40
41	48	59	72	90	10	35	63	96	34	77	26	80	42	11	41
42	50	60	74	92	12	37	65	99	36	80	28	83	45	14	42
43	52	62	76	94	14	39	68	5001	39	82	31	86	47	17	43
44	53	64	78	95	16	41	70	03	41	84	33	88	50	19	44
45	55	66	80	97	18	43	72	05	43	87	36	91	53	22	45
46	57	68	82	99	20	45	74	08	46	89	38	94	56	25	46
47	59	70	84	4501	23	47	76	10	48	92	41	96	58	28	47
48	61	72	86	03	25	50	79	12	51	94	43	99	61	31	48
49	62	74	88	05	27	52	81	14	53	97	46	5602	64	34	49
50	4164	4275	4390	4507	4629	4754	4883	5017	5155	5299	5448	5604	5767	5937	50
51	66	77	92	09	31	56	85	19	58	5301	51	07	70	40	51
52	68	79	94	11	33	58	87	21	60	04	54	10	72	43	52
53	70	81	96	13	35	60	90	23	62	06	56	12	75	46	53
54	72	83	98	15	37	62	92	26	65	09	59	15	78	48	54
55	73	85	99	17	39	64	94	28	67	11	61	17	81	51	55
56	75	87	4401	19	41	66	96	30	69	14	64	20	83	54	56
57	77	89	03	21	43	69	98	33	72	16	66	23	86	57	57
58	79	91	05	23	45	71	4901	35	74	19	69	25	89	60	58
59	81	93	07	25	47	73	03	37	76	21	71	28	92	63	59

A Table of Meridional Parts.

M.	70d.	71d.	72d.	73d.	74d.	75d.	76d.	77d.	78d.	79d.	80d.	81d.	82d.	83d.	M.
0	5966	6146	6335	6534	6746	6970	7210	7467	7745	8046	8375	8739	9145	9606	0
1	69	49	38	38	49	74	14	72	49	51	81	45	53	14	1
2	72	52	41	41	53	78	18	76	54	56	87	52	60	22	2
3	75	55	45	45	57	82	22	81	59	61	93	58	67	31	3
4	78	58	48	48	60	86	27	85	64	67	98	65	74	39	4
5	81	61	51	52	64	90	31	90	69	72	8404	71	82	47	5
6	84	64	54	55	68	94	35	94	74	77	10	78	89	55	6
7	86	67	58	58	71	97	39	98	78	83	16	84	96	64	7
8	89	70	61	62	75	7001	43	7503	83	88	22	91	9203	72	8
9	92	73	64	65	79	05	47	07	88	93	27	97	11	80	9
10	5995	6177	5367	6569	6782	7009	7252	7512	7793	8099	8433	8804	9218	9689	10
11	98	80	71	72	86	13	56	16	98	8104	39	10	25	97	11
12	6001	83	74	76	90	17	60	21	7803	09	45	17	33	9706	12
13	04	86	77	79	93	21	64	25	08	15	51	23	40	14	13
14	07	89	80	83	97	25	68	30	13	20	57	30	48	23	14
15	10	92	84	86	6801	29	73	35	17	25	63	36	55	31	15
16	13	95	87	90	04	33	77	39	22	31	69	43	62	40	16
17	16	98	90	93	08	37	81	44	27	36	74	49	70	48	17
18	19	6201	94	96	12	41	85	48	32	41	80	56	77	57	18
19	22	05	97	6600	15	45	89	53	37	47	86	63	85	65	19
20	6025	6208	6400	6603	6819	7049	7294	7557	7842	8152	8492	8869	9292	9774	20
21	28	11	03	07	23	52	98	62	47	58	98	76	9300	83	21
22	31	14	07	10	26	56	7302	66	52	63	8504	83	07	91	22
23	34	17	10	14	30	60	06	71	57	68	10	89	15	9800	23
24	37	20	13	17	34	64	11	76	62	74	16	96	22	09	24
25	40	23	17	21	38	68	15	80	67	79	22	8903	30	17	25
26	43	26	20	24	41	72	19	85	72	85	28	09	37	26	26
27	46	30	23	28	45	76	23	89	77	90	34	16	45	35	27
28	49	33	27	31	49	80	28	94	82	96	40	23	53	44	28
29	52	36	30	35	53	84	32	98	87	8201	46	30	60	52	29
30	6055	2639	6433	6639	6856	7088	7336	7603	7892	8207	8552	8936	9368	9861	30
31	58	42	37	42	60	92	41	08	97	12	58	43	76	70	31
32	61	45	40	46	64	96	45	12	7902	18	65	50	83	79	32
33	64	49	43	49	68	7100	49	17	07	23	71	57	91	88	33
34	67	52	47	53	71	04	53	22	12	29	77	63	99	97	34
35	70	55	50	56	75	08	58	26	17	34	83	70	9407	9906	35
36	73	58	53	60	79	12	62	31	22	40	89	77	14	15	36
37	76	61	57	63	83	16	66	36	27	45	95	84	22	24	37
38	79	64	60	67	86	20	71	40	32	51	8601	91	30	33	38
39	82	68	63	70	90	24	75	45	37	56	07	98	38	42	39
40	6085	6271	6467	6674	6894	7128	7379	7650	7942	8262	8614	9005	9445	9951	40
41	88	74	70	77	98	32	84	54	48	67	20	12	53	59	41
42	91	77	73	81	6901	36	88	59	53	73	26	18	61	69	42
43	94	80	77	85	05	40	92	64	58	79	32	25	69	78	43
44	97	83	80	88	09	45	97	68	63	84	38	32	77	87	44
45	6100	87	83	92	13	49	7401	73	68	90	44	39	85	9996	45
46	03	90	87	95	17	53	06	78	73	95	51	46	93	10005	46
47	06	93	90	99	20	57	10	83	78	8301	57	53	9501	10015	47
48	09	96	94	6702	24	61	14	87	83	07	63	60	09	10024	48
49	12	99	97	06	28	65	19	92	89	12	69	67	17	10033	49
50	6115	6303	6500	6710	6932	7269	7423	7697	7994	8218	8676	9074	9525	10043	50
51	18	06	04	13	36	73	27	7702	99	24	82	81	33	10052	51
52	21	09	07	17	40	77	32	06	8004	29	88	88	41	10061	52
53	24	12	11	20	43	81	36	11	09	35	95	96	49	10071	53
54	27	15	14	24	47	85	41	16	14	41	8701	9102	57	10080	54
55	30	19	17	28	51	89	45	21	20	47	07	10	65	10089	55
56	33	22	21	31	55	94	49	25	25	52	14	17	73	10099	56
57	36	25	24	35	59	98	54	30	30	58	20	24	81	10108	57
58	40	28	28	38	63	7202	58	35	35	64	26	31	89	10118	58
59	43	32	31	42	66	06	63	40	40	69	33	38	98	10127	59

A TABLE for finding the HOUR.

M	S.	½ Elapſ. Time.	Middle Time.	Riſing.		M	S.	½ Elapſ. Time.	Middle Time.	Riſing.
0	30	2.66121	2.63982	9.37654	} Co. ar.	30	30	6.87717	4.42386	2.94656
1	00	2.36018	2.94085	97860		31	00	87015	43088	96067
1	30	2.18409	3.11694	0.33078		31	30	86324	43779	97454
2	00	2.05916	24187	58066		32	00	85644	44459	98820
2	30	1.96225	33878	77448		32	30	84976	45127	3.00164
3	00	88307	41796	93284		33	00	84317	45786	01488
3	30	81613	48490	1.06673		33	30	83669	46434	02792
4	00	75814	54289	18271		34	00	83030	47073	04077
4	30	70700	69403	28502		34	30	82400	47703	05342
5	00	66125	63978	37653		35	00	81780	48323	06590
5	30	1.61986	3.68117	1.45931		35	30	8.81169	4.48934	3.07819
6	00	58208	71895	53488		36	00	80567	49536	09032
6	30	54733	75370	60440		36	30	79973	50130	10227
7	00	51515	78588	66877		37	00	79387	50716	11406
7	30	48520	81583	72869		37	30	78809	51294	12570
8	00	45718	84385	78474		38	00	78239	51864	13718
8	30	43086	87017	83739		38	30	77677	52426	14850
9	00	40605	89498	88703		39	00	77122	52981	15969
9	30	38258	91845	93399		39	30	76574	53529	17072
10	00	36032	94071	97854		40	00	76033	54070	18162
10	30	1.33915	3.96188	2.02091		40	30	0.75499	4.54604	3.19238
11	00	31896	98207	06131		41	00	74972	55131	20301
11	30	29967	4.00136	09991		41	30	74451	55652	21351
12	00	28120	01983	13687		42	00	73937	56166	22389
12	30	26349	03754	17232		42	30	73429	56674	23414
13	00	24647	05456	20638		43	00	72926	57176	24427
13	30	23010	07093	23915		43	30	72430	57673	25428
14	00	21432	08671	27073		44	00	71940	58163	26418
14	30	19910	10193	30120		44	30	71455	58648	27396
15	00	18440	11663	33063		45	00	70976	59127	28363
15	30	1.17018	4.13085	2.35910		45	30	0.70503	4.59600	3.29320
16	00	15642	14461	38667		46	00	70034	60069	30266
16	30	14307	15796	41338		46	30	69571	60532	31202
17	00	13013	17090	43930		47	00	69113	60990	32128
17	30	11757	18346	46447		47	30	68660	61443	33044
18	00	10536	19567	48893		48	00	68212	61891	33950
18	30	09348	20755	51271		48	30	67769	62334	34847
19	00	08193	21910	53586		49	00	67330	62773	35734
19	30	07067	23036	55841		49	30	66896	63207	36613
20	00	05970	24133	58039		50	00	66406	63637	37482
20	30	1.04901	4.25202	2.60182		50	30	0.66641	4.64062	2.38343
21	00	03857	26246	62274		51	00	65620	64483	39195
21	30	02838	27265	64316		51	30	65204	64899	40039
22	00	01843	28260	66312		52	00	64791	65312	40875
22	30	00870	29233	68262		52	30	64383	65720	41702
23	00	0.99918	30185	70170		53	00	63978	66125	42523
23	30	98988	31115	72036		53	30	63578	66525	43334
24	00	98077	32026	73863		54	00	63181	66922	44138
24	30	97184	32919	75652		54	30	62789	67314	44935
25	00	96310	33793	77505		55	00	62400	67703	45724
25	30	0.95454	4.34649	2.79124		55	30	0.62014	4.68089	3.46507
26	00	94614	35489	80809		56	00	61632	68471	47282
26	30	93791	36313	82461		56	30	61254	68849	48050
27	00	92982	37121	84083		57	00	60879	69224	48811
27	30	92189	37914	85675		57	30	60508	69595	49566
28	00	91411	38692	87238		58	00	60140	69963	50314
28	30	90646	39457	88773		58	30	59775	70328	51056
29	00	89894	40209	90282		59	00	59414	70689	51791
29	30	89156	40947	91765		59	30	59056	71047	52520
30	00	88430	41673	93223		60	00	58700	71403	53243

LATITUDE by two Altitudes.

1 HOUR.

M	S.	½ Elapſ. Time.	Middle Time.	Riſings.	M	S.	½ Elapſ. Time.	Middle Time.	Riſing.
00	30	0.58348	4.71755	3.53959	30	30	0.41488	4.88615	3.88625
01	00	57999	72104	54670	31	00	41261	88842	89097
01	30	57653	72450	55375	31	30	41036	89067	89567
02	00	57310	72793	56074	32	00	40812	89291	90034
02	30	56970	73133	56767	32	30	40590	89513	90498
03	00	56633	73470	57455	33	00	40368	89734	90960
03	30	56298	73805	58137	33	30	40149	89954	91420
04	00	55966	74137	58814	34	00	39930	90173	91876
04	30	55637	74466	59486	34	30	39713	90390	92331
05	00	55311	74792	60152	35	00	39497	90606	92782
05	30	0.54987	4.75116	3.60813	35	30	0.39282	4.90821	3.93232
06	00	54666	75437	61469	36	00	39069	91034	93679
06	30	54347	75756	62120	36	30	38856	91247	94123
07	00	54031	76072	62766	37	00	38646	91457	94566
07	30	53718	76385	63407	37	30	38436	91667	95005
08	00	53406	76697	64043	38	00	38227	91876	95443
08	30	53097	77005	64675	38	30	38020	92083	95878
09	00	52791	77312	65302	39	00	37814	92289	96311
09	30	52487	77616	65924	39	30	37609	92494	96742
10	00	52186	77917	66542	40	00	37405	92698	97170
10	30	0.51886	4.78217	3.67156	40	30	0.37203	4.92900	3.97597
11	00	51589	78514	67765	41	00	37001	93102	98021
11	30	51294	78809	68369	41	30	36801	93301	98443
12	00	51002	79101	68969	42	00	36602	93501	98862
12	30	50711	79392	69566	42	30	36403	93700	99280
13	00	50423	79680	70158	43	00	36206	93897	99696
13	30	50137	79966	70745	43	30	36011	94097	4.00109
14	00	49852	80251	71329	44	00	35816	94287	00521
14	30	49570	80533	71909	44	30	35622	94481	00930
15	00	49290	80813	72485	45	00	35429	94673	01337
15	30	0.49012	4.81091	3.73057	45	30	0.35238	4.94865	4.01743
16	00	48736	81367	73625	46	00	35047	95056	02146
16	30	48402	81641	74189	46	30	34858	95245	02547
17	00	48189	81914	74750	47	00	34669	95434	02947
17	30	47919	82184	75307	47	30	34482	95621	03344
18	00	47650	82453	75860	48	00	34295	95808	03740
18	30	47384	82719	76409	48	30	34110	95993	04134
19	00	47119	82984	76955	49	00	33925	96178	04526
19	30	46856	83247	77498	49	30	33742	96361	04916
20	00	46595	83508	78037	50	00	33559	96544	05304
20	30	0.46335	4.83768	3.78573	50	30	0.33378	4.96725	4.05690
21	00	46078	84025	79105	51	00	33197	96906	06074
21	30	45822	84281	79634	51	33	33018	97085	06457
22	00	45567	84536	80159	52	00	32839	97264	06838
22	30	45315	84788	80682	52	30	32661	97442	07217
23	00	45064	85039	81201	53	00	32485	97618	07595
23	30	44815	85288	81717	53	30	32309	97794	07970
24	00	44567	85536	82230	54	00	32134	97969	08344
24	30	44321	85782	82739	54	30	31960	98143	08716
25	00	44077	86026	83240	55	00	31787	98316	09087
25	30	0.43834	4.86269	3.83749	55	30	0.31614	4.98489	4.09456
26	00	43592	86511	84250	56	00	31443	98660	09823
26	30	43353	86750	84748	56	30	31272	98831	10188
27	00	43114	86989	85242	57	00	31103	99000	10552
27	30	42878	87225	85734	57	30	30934	99169	10914
28	00	42642	87461	86223	58	00	30766	99337	11275
28	30	42409	87694	86709	58	30	30599	99504	11634
29	00	42176	87927	87192	59	00	30433	99670	11992
29	30	41945	88158	87672	59	30	30268	99835	12348
30	00	41716	88387	88150	60	00	30103	5.00000	12702

A TABLE for finding the
2 HOURS.

M	S.	½ Elapſ. Time.	Middle Time.	Riſing.	M	S.	½ Elapſ. Time.	Middle Time.	Riſing.
01	30	0. 29939	5. 00164	4. 13055	30	30	0. 21432	5. 08671	4. 31801
01	00	29776	00327	13406	31	00	21309	08794	32079
01	30	29614	00489	13756	31	30	21187	08916	32355
02	00	29453	00650	14104	32	00	21066	09037	32631
02	30	29293	00810	14451	32	30	20945	09158	32906
03	00	29133	00970	14797	33	00	20824	09279	33180
03	30	28974	01129	15140	33	30	20704	09399	33452
04	00	28816	01287	15483	34	00	20585	09518	33724
04	30	28659	01444	15824	34	30	20466	09637	33995
05	00	28502	01601	16163	35	00	20348	09755	34265
05	30	0. 28346	5. 01757	4. 16501	35	30	0. 20230	5. 09873	4. 34534
06	00	28191	01912	16838	36	00	20113	09990	34802
06	30	28037	02066	17173	36	30	19996	10107	35069
07	00	27884	02219	17507	37	00	19880	10223	35335
07	30	27731	02372	17839	37	30	19764	10339	35600
08	00	27579	02524	18171	38	00	19648	10454	35865
08	30	27428	02675	18500	38	36	19534	10569	36128
09	00	27277	02826	18829	39	00	19420	10683	36391
09	30	27127	02976	19156	39	30	19306	10797	36652
10	00	26978	03125	19482	40	00	19193	10910	36913
10	30	0. 26830	5. 03273	4. 19806	40	30	0. 19080	5. 11023	4. 37173
11	00	26682	03421	20129	41	00	18968	11135	37432
11	30	26535	03568	20451	41	30	18857	11246	37690
12	00	26389	03714	20771	42	00	18746	11357	37948
12	30	26244	03859	21091	42	30	18635	11468	38204
13	00	26099	04004	21409	43	00	18525	11578	38460
13	30	25955	04148	21725	43	30	18415	11688	38714
14	00	25811	04292	22041	44	00	18306	11797	38968
14	30	25668	04435	22355	44	30	18197	11906	39221
15	00	25526	04577	22668	45	00	18089	12014	39473
15	30	0. 25385	5. 04718	4. 22980	45	30	0. 17981	5. 12122	4. 39724
16	00	25244	04859	23290	46	00	1787	12229	39975
16	30	25104	04999	23599	46	30	17767	12336	40225
17	00	24964	05139	23907	47	00	17660	12443	40474
17	30	24825	05278	24214	47	30	17554	12549	40722
18	00	24687	05416	24520	48	00	17449	12654	40969
18	30	24550	05553	24825	48	30	17344	12759	41215
19	00	24413	05690	25128	49	00	17239	12864	41461
19	30	24277	05826	25430	49	30	17135	12968	41706
20	00	24141	05962	25731	50	00	17031	13071	41950
20	30	0. 24006	5. 06097	4. 26031	50	30	0. 16928	5. 13174	4. 42193
21	00	23871	06232	26330	51	00	16826	13277	42435
21	30	23738	06365	26628	51	30	16724	13379	42677
22	00	23605	06498	26924	52	00	16622	13481	42918
22	30	23472	06631	27220	52	30	16520	13583	43158
23	00	23340	06763	27514	53	00	16419	13684	43398
23	30	23209	06894	27807	53	30	16319	13784	43636
24	00	23078	07025	28099	54	00	16219	13884	43874
24	30	22948	07155	28391	54	30	16119	13984	44111
25	00	22819	07284	28681	55	00	16029	14083	44384
25	30	0. 22690	5. 07413	4. 28969	55	30	0. 15921	5. 14182	4. 44583
26	00	22561	07542	29257	56	00	15823	14280	44818
26	30	22433	07670	29544	56	30	15725	14378	45052
27	00	22306	07797	29830	57	00	15627	14476	45286
27	30	22180	07923	30115	57	30	15530	14573	45518
28	00	22054	08049	30398	58	00	15434	14669	45750
28	30	21928	08175	30681	58	30	15338	14765	45981
29	00	21803	08300	30963	59	00	15242	14861	46212
29	30	21679	08424	31244	59	30	15146	14957	46442
30	00	21555	08548	31523	00	00	15051	15052	46671

LATITUDE by Two Altitudes.

3 HOURS,

M	S.	½ Elapſ. Time.	Middle Time.	Riſing.	M	S.	½ Elapſ. Time.	Middle Time.	Riſing.
00	30	0. 14957	5. 15146	4. 46899	30	30	0. 09981	5. 20122	4. 59436
01	00	14863	15247	47127	31	00	09909	20194	59627
01	30	14769	15334	47354	31	30	09837	20266	59818
02	00	14676	15427	47580	32	00	09766	20338	60008
02	30	14583	15520	47806	32	30	09694	20409	60198
03	00	14490	15613	48031	33	00	09623	20480	60388
03	30	14398	15705	48255	33	30	09552	20551	60577
04	00	14306	15797	48479	34	00	09482	20621	60765
04	30	14215	15888	48702	34	30	09412	20691	60952
05	00	14124	15979	48924	35	00	09342	20760	61139
05	30	0. 14034	5. 16069	4. 49145	35	30	0. 09273	5. 20830	4. 61326
06	00	13944	16159	49366	36	00	09204	20899	61512
06	30	13854	16249	49586	36	30	09135	20268	61698
07	00	13765	16338	49806	37	00	09067	21036	61883
07	30	13676	16427	50025	37	30	08999	21104	62068
08	00	13587	16516	50243	38	00	08931	21172	62252
08	30	13499	16604	50460	38	30	08864	21239	62436
09	00	13411	16692	50677	39	00	08797	21306	62619
09	30	13324	16779	50893	39	30	08730	21373	62802
10	00	13237	16866	51109	40	00	08664	21439	62984
10	30	0. 13150	5. 16953	4. 51324	40	30	0. 08597	5. 21505	4. 63166
11	00	13064	17039	51539	41	00	08531	21571	63347
11	30	12971	17125	51753	41	30	08466	21637	63528
12	00	12893	17210	51966	42	00	08401	21702	63708
12	30	12808	17295	52178	42	30	08336	21767	63888
13	00	12723	17380	52390	43	00	08271	21832	64067
13	30	12638	17465	52601	43	30	08207	21896	64246
14	00	12554	17549	52812	44	00	08143	21960	64425
14	30	12474	17633	53022	44	30	08079	22025	64603
15	00	12487	17716	53231	45	00	08015	22088	64780
15	30	0. 12305	5. 17799	4. 53440	45	30	0007952	5. 22151	4. 64957
16	00	12222	17881	53648	46	00	07889	22214	65134
16	30	12140	17963	53856	46	30	07827	22276	65310
17	00	12058	18045	54063	47	00	07765	22338	65486
17	30	11977	18126	54269	47	30	07703	22400	65661
18	00	11896	18207	54475	48	00	07641	22462	65806
18	30	11815	18288	54680	48	30	07579	22524	66010
19	00	11734	18369	54885	49	00	07518	22585	66184
19	30	11654	18449	55089	49	30	07457	22646	66357
20	00	11574	18529	55293	50	00	07397	22707	66539
20	30	0. 11495	5. 186[illegible]8	4. 55496	50	30	0. 07337	5. 22766	4. 66702
21	00	11416	18687	55698	51	00	07277	22826	66874
21	30	11337	18766	55900	51	30	07217	22886	67046
22	00	11259	18844	56101	52	00	07158	22945	67217
22	30	11181	18922	56301	52	30	07099	23004	67388
23	00	11104	18999	56501	53	00	07040	23062	67558
23	30	11027	19076	56701	53	30	06981	23123	67728
24	00	10950	19153	56900	54	00	06923	23180	67897
24	30	10873	19230	57098	54	30	06865	23238	68066
25	00	10797	19306	57296	55	00	06808	23295	68235
25	30	0. 10721	5. 19382	4. 57494	55	30	0. 06751	5. 23352	4. 68403
26	00	10645	19458	57690	56	00	06694	23409	68571
26	30	10570	19533	57886	56	30	06637	23466	68738
27	00	10495	19608	58082	57	00	06580	23523	68905
27	30	10421	19682	58277	57	30	06524	23579	69071
28	00	10347	19756	58471	58	00	06468	23635	69237
28	30	10273	19830	58665	58	30	06412	23691	69403
29	00	10199	19904	58859	59	00	06357	23746	69568
29	30	10126	19977	59052	59	30	06302	23801	69733
30	00	10053	10050	59244	60	00	06247	23856	69897

A TABLE for finding the
4 HOURS.

M	S.	½ Elapſ. Time.	Middle Tims.	Riſing.	M	S.	½ Elapſ. Time.	Middle Time.	Riſing.
00	30	0.06192	5.23911	4.70001	30	30	0.03399	5.26704	4.79193
01	00	06138	23965	70224	31	00	03360	26743	79334
01	30	06084	24019	70387	31	30	03321	26782	79475
02	00	06030	24073	70550	32	00	03283	26820	79616
02	30	05977	24126	70712	32	30	03245	26858	79756
03	00	05924	24179	70874	33	00	03207	26896	79896
03	30	05871	24232	71036	33	30	03170	26934	80036
04	00	05818	24285	71197	34	00	03132	26971	80175
04	30	05766	24337	71352	34	30	03095	27008	80314
05	00	05714	24389	71518	35	00	03058	27045	80452
05	30	0.05662	5.24441	4.71678	35	30	0.03021	5.27082	4.80591
06	00	05610	24493	71837	36	00	02985	27118	80729
06	30	05559	24544	71996	36	30	02949	27154	80867
07	00	05508	24595	72155	37	00	02913	27190	81004
07	30	05457	24646	72313	37	30	02877	27226	81441
08	00	05406	24697	72471	38	00	02841	27262	81278
08	30	05356	24747	72628	38	30	02806	27297	81414
09	00	05306	24797	72786	39	00	02771	27332	81550
09	30	05256	24847	72942	39	30	02736	27307	81686
10	00	05207	24897	73098	40	00	02701	27402	81821
10	30	0.05158	5.24945	4.73254	40	30	0.02667	5.27436	4.81956
11	00	05109	24994	73410	41	00	02633	27470	82091
11	30	05060	25043	73565	41	30	02599	27504	82226
12	00	05012	25091	73720	42	00	02565	27538	82360
12	30	04964	25139	73874	42	30	02532	27571	82494
13	00	04916	25187	74028	43	00	02499	27604	82628
13	30	04868	25235	74182	43	30	02466	27637	82761
14	00	04821	25282	74335	44	00	02433	27670	82894
14	30	04774	25329	74488	44	30	02400	27703	83027
15	00	04727	25376	74641	45	00	02368	27735	83159
15	30	0.04680	5.25423	4.74793	45	30	0.02336	5.27767	4.83291
16	00	04634	25469	74945	46	00	02304	27799	83423
16	30	04588	25515	75096	46	30	02272	27831	83554
17	00	04542	25561	75247	47	00	02241	27862	83685
17	30	04496	25607	75398	47	30	02210	27893	83816
18	00	04451	25652	75549	48	00	02179	27924	83947
18	30	04406	25697	75699	48	30	02148	27955	84077
19	00	04361	25742	75848	49	00	02118	27985	84207
19	30	04316	25787	75997	49	30	02088	28015	84337
20	00	04272	25831	76146	50	00	02058	28045	84466
20	30	0.04228	5.25875	4.70295	50	30	0.02028	5.28075	4.84595
21	00	04184	25919	76443	51	00	01998	28105	84724
21	30	04141	25962	76591	51	30	01969	28134	84853
22	00	04098	26005	76738	52	00	01940	28163	84981
22	30	04055	26048	76885	52	30	01911	28192	85109
23	00	04012	26091	77032	53	00	01882	28221	85236
23	30	03969	26134	77197	53	30	01854	28249	85363
24	00	03927	26176	77325	54	00	01826	28277	85490
24	30	03885	26218	77471	54	30	01798	28305	85617
25	00	03843	26260	77616	55	00	01770	28333	85744
25	30	0.03801	5.20302	4.77761	55	30	0.01743	5.28360	4.85870
26	00	03760	26343	77906	50	00	01716	28387	85996
26	30	03719	26384	78050	56	30	01689	28414	86121
27	00	03678	26425	78194	57	00	01662	28441	86246
27	30	03638	26466	78338	57	30	01635	28468	86371
28	00	03597	26506	78481	58	00	01609	28494	86496
28	30	03557	26546	78624	58	30	01583	28520	86621
29	00	03517	26586	78767	59	00	01557	28546	86745
29	30	03478	26626	78909	59	30	01531	28572	86869
20	00	03428	26665	79051	60	00	01505	28598	86993

LATITUDE by Two Altitudes.

5 HOURS.

M	S.	½ Elapſ. Time.	Middle Time.	Riſing.	M	S.	½ Elapſ. Time.	Middle Time.	Riſing.
00	30	0. 01480	5. 28623	4. 87116	30	30	0. 00361	5. 29742	4. 94033
01	00	01455	28648	87239	31	00	00349	29754	94141
01	30	01430	28673	87362	31	30	00337	29766	94248
02	00	01405	28698	87484	32	00	00325	29778	94356
02	30	01381	28722	87606	32	30	00313	29790	94463
03	00	01357	28746	87728	33	00	00302	29801	94570
03	30	01333	28770	87850	33	30	00291	29812	94676
04	00	01309	28794	87971	34	00	00280	29823	94782
04	30	01286	28817	88092	34	30	00269	29834	94888
05	00	01263	28840	88213	35	00	00259	29844	94994
05	30	0. 01240	5. 28863	4. 88334	35	30	0. 00249	5. 29854	5. 95100
06	00	01217	28886	88454	36	00	00239	29864	95205
06	30	01194	28909	88574	36	30	00229	29874	95310
07	00	01172	28931	88694	37	00	00219	29884	95415
07	30	01150	28953	88814	37	30	00209	29894	95520
08	00	01128	28975	88933	38	00	00200	29903	95624
08	30	01106	28997	89052	38	30	00191	29912	95728
09	00	01084	29019	89171	39	00	00182	29911	95832
09	30	01063	29040	89289	39	30	00174	29929	95936
10	00	01042	29061	89407	40	00	00166	29937	96040
10	30	0. 01021	5. 29082	4. 89525	40	30	0. 00157	5. 29945	5. 96143
11	00	01000	29103	89643	41	00	00150	29953	96246
11	30	00980	29123	89760	41	30	00142	29961	96349
12	00	00960	29143	89877	42	00	00134	29969	96452
12	30	00940	29163	89994	42	30	00127	29976	96554
13	00	00928	29183	90111	43	00	00120	29983	96656
13	30	00900	29203	90227	43	30	00113	29990	96758
14	00	00881	29222	90343	44	00	00106	29997	96860
14	30	00862	29241	90459	44	30	00099	30004	96961
15	00	00843	29260	90575	45	00	00093	30010	97062
15	30	0. 00824	5. 29279	4. 90690	45	30	0. 00087	5. 30016	4. 97163
16	00	00805	29298	90805	46	00	00081	30022	97264
16	30	00787	29316	90920	46	30	00075	30028	97365
17	00	00769	29334	91035	47	00	00070	30033	97465
17	30	00751	29352	91149	47	30	00065	30038	97565
18	00	00733	29370	91263	48	00	00060	30043	97665
18	30	00716	29387	91377	48	30	00055	30048	97765
19	00	00699	29404	91490	49	00	00050	30053	97865
19	30	00682	29421	91603	49	30	00045	30053	97964
20	00	00665	29438	91716	50	00	00041	30062	98063
20	30	0. 00648	5. 29455	4. 91829	50	30	0. 00037	5. 30066	5. 98162
21	00	00632	29471	91942	51	00	00033	30070	98261
21	30	00616	29487	92054	51	30	00029	30074	98359
22	00	00600	29503	92166	52	00	00026	30077	98457
22	30	00584	29519	92278	52	30	00023	30080	98555
23	00	00568	29535	92390	53	00	00020	30083	98653
23	30	00553	29550	92501	53	30	00017	30086	98751
24	00	00538	29565	92612	54	00	00015	30088	98848
24	30	00523	29580	92723	54	30	00012	30090	98945
25	00	00508	29595	92834	55	00	00010	30092	99042
25	30	0. 00494	5. 29609	4. 92944	55	30	0. 00008	5. 30094	5. 99139
26	00	00480	29623	93054	56	00	00007	30096	99236
26	30	00466	29637	93164	56	30	00005	30098	99332
27	00	00452	29651	93274	57	00	00004	30099	99428
27	30	00438	29665	93383	57	30	00003	30100	99524
28	00	00425	29678	93492	58	00	00002	30101	99620
28	30	00412	29691	93601	58	30	00001	30102	99715
29	00	00399	29704	93709	59	00	00000	30103	99810
29	30	00386	29717	93817	59	30	00000	30103	99905
30	00	00373	29730	93925	60	00	00000	30102	5. 00000

A Table of Natural Sines.

	0		1		2		3		4		
M.	N.ſine	N.Coſ.	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	M.
0	.00	100000	1745	99985	3490	99939	5234	99863	6976	99756	60
1	29	0000	1774	984	3519	938	5263	861	7005	754	59
2	58	0000	1803	984	3548	937	5292	860	7034	752	58
3	87	0000	1832	983	3577	936	5321	858	7063	750	57
4	116	0000	1862	983	3606	935	5350	857	7092	748	56
5	145	0000	1891	982	3635	934	5379	855	7121	746	55
6	175	0000	1920	982	3664	933	5408	854	7150	744	54
7	204	10000	1949	99981	3693	99932	5437	99852	7179	99742	53
8	233	0000	1978	980	3723	931	5466	851	7208	740	52
9	262	0000	2007	980	3752	930	5495	849	7237	738	51
10	291	0000	2036	979	3781	929	5524	847	7266	736	50
11	323	99999	2065	979	3810	927	5553	846	7295	734	49
12	349	999	2094	978	3839	926	5582	844	7324	731	48
13	378	99999	2123	99977	3868	99925	5611	99842	7353	99729	47
14	407	999	2152	977	3897	924	5640	841	7382	728	46
15	436	999	2181	976	3926	923	5669	839	7411	725	45
16	465	999	2211	976	3955	922	5698	838	7440	723	44
17	495	999	2240	975	3984	921	5727	836	7469	721	43
18	524	999	2269	974	4013	919	5756	834	7498	719	42
19	553	99998	2298	99974	4042	99918	5785	99833	7527	99716	41
20	582	998	2327	973	4071	917	5814	831	7556	714	40
21	611	998	2356	972	4100	916	5844	829	7585	712	39
22	640	998	2385	972	4129	915	5873	827	7614	710	38
23	669	998	2414	971	4159	914	5902	826	7643	708	37
24	698	998	2443	970	4188	912	5931	824	7672	705	36
25	727	99997	2472	99969	4217	9911	5960	99822	7701	99703	35
26	756	997	2501	969	4246	910	5989	821	7730	701	34
27	785	997	2530	968	4275	909	6018	819	7759	699	33
28	814	997	2560	967	4304	907	6047	817	7788	696	32
29	844	996	2589	966	4333	906	6076	815	7817	694	31
30	873	996	2618	966	4362	905	6105	813	7846	692	30
31	902	99996	2647	99965	4391	99904	6134	99812	7875	99689	29
32	931	996	2676	964	4420	902	6163	810	7904	687	28
33	960	995	2705	963	4449	901	6192	808	7933	685	27
34	989	995	2734	963	4478	900	6221	806	7962	683	26
35	1018	995	2763	962	4507	898	6250	804	7991	680	25
36	1047	995	2792	961	4536	897	6279	803	8020	678	24
37	1076	99994	2821	99960	4565	99896	6308	99801	8049	99676	23
38	1105	994	2850	959	4594	894	6337	799	8078	673	22
39	1134	994	2879	959	4023	893	6366	797	8107	671	21
40	1164	993	2908	958	4653	892	6395	795	8136	668	20
41	1193	993	2938	957	4682	890	6424	793	8165	666	19
42	1222	993	2967	956	4711	889	6453	792	8194	664	18
43	1251	99992	2996	99955	4740	99888	6482	99790	8223	99661	17
44	1280	992	3025	954	4769	886	6511	788	8252	659	16
45	1309	991	3054	953	4798	885	6540	786	8281	657	15
46	1338	991	3083	952	4827	883	6569	784	8310	654	14
47	1367	991	3112	952	4856	882	6590	782	8339	652	13
48	1396	990	3141	951	4885	881	6627	780	8368	649	12
49	1425	99990	3170	99950	4914	99879	6656	99778	8397	99647	11
50	1454	989	3199	949	4943	878	6685	776	8426	644	10
51	1483	989	3228	948	4972	876	6714	774	8455	642	9
52	1513	989	3257	947	5001	875	6743	772	8484	639	8
53	1542	988	3286	946	5030	873	6773	770	8513	637	7
54	1571	988	3316	945	5059	872	6802	768	8542	635	6
55	1600	99987	3345	99944	5088	99870	6835	99766	8571	99632	5
56	1629	987	3374	943	5117	869	6860	764	8600	630	4
57	1658	986	3403	942	5146	867	6889	762	8629	627	3
58	1687	986	3432	941	5175	866	6918	760	8658	625	2
59	1716	985	3461	940	5205	864	6947	758	8687	632	1
	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	
	89		88		87		86		85		

A Table of Natural Sines.

	5		6		7		8		9		
M.	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	M.
0	8716	99619	10453	99452	12187	99255	13917	99027	15643	98769	60
1	8745	617	482	449	216	251	946	023	672	764	59
2	8774	614	511	446	245	248	975	019	701	760	58
3	8803	612	540	443	274	244	14004	015	730	755	57
4	8831	609	569	440	302	240	033	011	758	751	56
5	8860	607	597	437	331	237	061	006	787	746	55
6	8889	604	626	434	360	233	090	002	816	741	54
7	8918	99602	10655	99431	12389	99230	14119	98998	15845	98737	53
8	8947	599	684	428	418	226	148	994	873	732	52
9	8976	596	713	424	447	222	177	990	902	728	51
10	9005	594	742	421	476	219	205	986	931	723	50
11	9034	591	771	418	504	215	234	982	959	718	49
12	9063	588	800	415	533	211	203	978	988	714	48
13	9092	99586	10829	99412	12562	99208	14292	98973	16017	98709	47
14	9121	583	858	409	691	204	320	969	046	704	46
15	9150	580	887	406	620	200	349	965	074	700	45
16	9179	578	916	402	649	197	378	961	103	695	44
17	9208	575	945	399	678	193	407	957	132	690	43
18	9237	572	973	396	706	189	436	953	160	686	42
19	9266	99570	11002	99393	12735	99186	14464	98948	16189	98681	41
20	9295	567	031	390	764	182	493	944	218	676	40
21	9324	564	060	386	793	178	522	940	246	671	39
22	9353	562	089	383	822	175	551	936	275	667	38
23	9382	559	118	380	851	171	580	931	304	662	37
24	9411	556	147	377	880	167	608	927	333	657	36
25	9440	99553	11176	99374	12908	99163	14637	98923	16361	98652	35
26	9469	551	205	370	937	160	666	919	390	648	34
27	9498	548	234	367	966	156	695	914	419	643	33
28	9527	545	263	364	995	152	723	910	447	638	32
29	9556	542	291	360	13024	148	752	906	476	633	31
30	9585	540	320	357	053	144	781	902	505	629	30
31	9614	99537	11349	99354	13081	99141	14810	98897	16533	98624	29
32	9642	534	378	351	110	137	838	893	562	619	28
33	9671	531	407	347	139	133	867	889	591	614	27
34	9700	528	436	344	168	129	896	884	620	609	26
35	9729	526	465	341	197	125	925	880	648	604	25
36	9758	523	494	337	226	122	954	876	677	600	24
37	9787	99520	11523	99334	13254	99118	14982	98871	16706	98595	23
38	9816	517	552	331	283	114	15011	867	734	590	22
39	9845	514	580	327	312	110	040	863	763	585	21
40	9874	511	609	324	341	106	069	858	792	580	20
41	9903	508	638	320	370	102	097	854	820	575	19
42	9932	506	667	317	399	098	126	849	849	570	18
43	9961	99503	11696	99314	13427	99094	15155	98845	16878	98565	17
44	9990	500	725	310	456	091	184	841	906	561	16
45	10019	497	754	307	485	087	212	836	935	556	15
46	10048	494	783	303	514	083	241	832	964	551	14
47	10077	491	812	300	543	079	270	827	992	546	13
48	10106	488	840	297	572	075	299	823	17021	541	12
49	10135	99485	11869	99293	13600	99071	15327	98818	17050	98536	11
50	10164	482	898	290	629	067	356	814	078	531	10
51	10192	479	927	286	658	063	385	809	107	526	9
52	10221	476	956	283	687	059	414	805	136	521	8
53	10250	473	985	279	716	055	442	800	164	516	7
54	10279	470	12014	276	744	051	471	796	193	511	6
55	10308	99467	12043	99272	13773	99047	15500	98791	17222	98506	5
56	10337	464	071	269	802	043	529	787	250	501	4
57	10366	461	100	265	831	039	557	782	279	496	3
58	10395	458	129	262	860	035	586	778	308	491	2
59	10424	455	158	258	889	031	615	772	336	486	1
	N.Coſ	N.ſine	NCoſ	N.ſine	NCoſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	
	84		83		82		81		80		

A Table of Natural Sines.

	10		11		12		13		14		
M.	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	M.
0	17365	98481	19081	98163	20791	97815	22495	97437	24192	97030	60
1	393	476	109	157	820	809	523	430	220	023	59
2	422	471	138	152	848	803	552	424	249	015	58
3	451	466	167	146	877	797	580	417	277	008	57
4	479	460	195	140	905	790	608	411	305	001	56
5	508	455	224	135	933	784	637	404	333	96994	55
6	537	450	252	129	962	778	665	398	361	987	54
7	17565	98445	19281	98124	20990	97772	22693	97391	24390	96980	53
8	594	440	309	118	21019	766	722	384	418	973	52
9	623	435	338	112	047	760	750	378	446	966	51
10	651	430	366	107	076	754	778	371	474	959	50
11	680	425	395	101	104	748	807	365	503	952	49
12	708	420	42[illegible]	096	132	742	835	358	531	945	48
13	17737	98414	19452	98090	21161	97735	22863	97351	24559	96937	47
14	766	409	480	084	189	729	892	345	587	930	46
15	794	404	509	079	218	723	920	338	615	923	45
16	823	399	538	073	246	717	948	331	644	916	44
17	852	394	566	067	275	711	977	325	672	909	43
18	880	389	595	061	303	705	23005	318	700	902	42
19	17909	98383	19623	98056	21331	97698	23033	97311	24728	96894	41
20	937	378	652	050	360	692	062	304	756	887	40
21	966	373	680	044	388	686	090	298	784	880	39
22	995	368	709	039	417	680	118	291	813	873	38
23	18023	362	737	033	445	673	146	284	841	866	37
24	052	357	766	027	474	667	175	278	869	858	36
25	18081	98352	19794	98021	21502	97661	23203	97271	24897	96851	35
26	109	347	823	016	530	655	231	264	925	844	34
27	138	341	851	010	559	648	260	257	953	837	33
28	166	336	88	004	587	642	288	251	982	829	32
29	195	331	908	97998	616	636	316	244	25010	822	31
30	224	325	937	992	644	630	345	237	038	815	30
31	18252	98320	19965	97987	21672	97623	23375	97230	25066	96807	29
32	281	315	994	981	701	617	401	223	094	800	28
33	309	310	20022	975	729	611	429	217	122	793	27
34	338	304	051	969	758	604	458	210	151	786	26
35	367	299	079	963	786	598	486	203	179	778	25
36	395	294	108	958	814	592	514	196	207	771	24
37	18424	98288	20136	97952	21843	97585	23542	97189	25235	96764	23
38	452	283	165	946	871	579	571	182	263	756	22
39	481	277	193	940	899	573	599	176	291	749	21
40	509	272	222	934	928	566	627	169	320	742	20
41	538	267	250	928	956	560	656	162	348	734	19
42	567	261	279	922	985	5[illegible]3	684	155	376	727	18
43	18595	98256	20307	97916	22013	97547	23712	97148	25404	96719	17
44	624	250	336	910	041	541	740	141	432	712	16
45	652	245	364	905	070	534	769	134	460	705	15
46	681	240	393	899	098	528	797	127	488	697	14
47	710	234	421	893	126	521	825	120	516	690	13
48	738	229	450	887	155	515	853	113	545	682	12
49	18767	98223	20478	97881	22185	97508	23882	97106	25573	96675	11
50	795	218	507	875	212	502	910	100	601	667	10
51	824	212	535	869	240	496	938	093	629	660	9
52	852	207	563	863	268	489	966	086	657	653	8
53	881	201	592	857	297	483	995	079	685	645	7
54	910	196	620	851	325	476	24023	072	713	638	6
55	18938	98190	20649	97845	22353	97470	24051	97[illegible]65	25741	96630	5
56	967	185	677	839	382	463	079	058	769	623	4
57	995	179	706	833	410	457	108	051	798	615	3
58	19024	174	734	827	438	450	136	044	826	608	2
59	052	168	763	821	467	444	164	037	854	600	1
	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	
	79		78		77		76		75		

A Table of Natural Sines.

	15		16		17		18		19		
M.	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	M.
0	25882	96593	27564	96126	29237	95630	30902	95106	32557	94552	60
1	910	585	592	118	265	622	929	097	584	542	59
2	938	578	620	110	293	613	957	088	612	533	58
3	966	570	648	102	321	605	985	079	639	523	57
4	994	562	676	094	348	596	31012	070	667	514	56
5	26022	555	704	086	376	588	040	061	694	504	55
6	050	547	731	078	404	579	068	052	722	495	54
7	26079	96540	27759	96070	29432	95571	31095	95043	32749	94485	53
8	107	532	787	062	460	562	123	033	777	476	52
9	135	524	815	054	487	554	151	024	804	466	51
10	163	517	843	046	515	545	178	015	832	457	50
11	191	509	871	037	543	536	206	006	859	447	49
12	219	502	899	029	571	528	233	94997	887	438	48
13	26247	96494	27927	96021	29599	95519	31261	94988	32914	94428	47
14	275	486	955	013	626	511	289	979	942	418	46
15	303	479	983	005	654	502	316	970	969	409	45
16	331	471	28011	95997	682	493	344	961	997	399	44
17	359	463	039	989	710	485	372	952	33024	390	43
18	387	456	067	981	737	476	399	943	051	380	42
19	26415	96448	28095	95972	29765	95467	31427	94933	33079	94370	41
20	443	440	123	964	793	459	454	924	106	361	40
21	471	433	150	956	821	450	482	915	134	351	39
22	500	425	178	948	849	441	510	906	161	342	38
23	528	417	206	940	876	433	537	897	189	332	37
24	556	410	234	931	904	424	565	888	216	322	36
25	26584	96402	28262	95923	29932	95415	31593	94878	33244	94313	35
26	612	394	290	915	960	407	620	869	271	303	34
27	640	386	318	907	987	398	648	860	298	293	33
28	668	379	346	898	30015	389	675	851	326	284	32
29	696	371	374	890	043	380	703	842	353	274	31
30	724	363	402	882	071	372	730	832	381	264	30
31	26752	96355	28429	95874	30098	95363	31758	94823	33408	94254	29
32	780	347	457	865	126	354	786	814	436	245	28
33	808	340	485	857	154	345	813	805	463	235	27
34	836	332	513	849	182	337	841	795	490	225	26
35	864	324	541	841	209	328	868	786	518	216	25
36	892	316	569	832	237	319	869	777	545	206	24
37	26920	96308	28597	95824	30265	95310	31923	94768	33573	94196	23
38	948	301	625	816	292	301	951	758	600	186	22
39	976	293	652	807	320	293	979	749	627	176	21
40	27004	285	687	799	348	284	32006	740	655	167	20
41	032	277	708	791	376	275	034	730	682	157	19
42	060	269	736	782	403	266	061	721	710	147	18
43	27088	96261	28764	95774	30431	95257	32089	94712	33737	94137	17
44	116	253	792	766	459	248	116	702	764	127	16
45	144	246	820	757	486	240	144	693	792	118	15
46	172	238	847	749	514	231	171	684	819	108	14
47	200	230	875	740	542	222	199	674	846	098	13
48	228	222	903	732	570	213	227	665	874	088	12
49	27256	96214	28931	95724	30597	95204	32254	94656	33901	94078	11
50	284	206	959	715	625	195	282	646	929	068	10
51	312	198	987	707	653	186	309	637	956	058	9
52	340	190	29015	698	680	177	337	627	983	049	8
53	368	182	042	690	708	168	364	618	34011	039	7
54	396	174	070	681	736	159	392	609	038	029	6
55	27424	96166	29098	95673	30763	95150	32419	94599	34065	94019	5
56	452	158	126	664	791	142	447	590	093	009	4
57	480	150	154	656	819	133	474	580	120	93999	3
58	508	142	182	647	846	124	502	571	147	989	2
59	536	134	209	639	874	115	529	561	175	979	1
	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	
	74		73		72		71		70		

A Table of Natural Sines.

	20		21		22		23		24		
M.	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	M.
0	34202	93969	35837	93358	37461	92718	39073	92050	40674	91355	60
1	229	959	864	348	488	707	100	039	700	343	59
2	257	949	891	337	515	697	127	028	727	331	58
3	284	939	918	327	542	686	153	016	753	319	57
4	311	929	945	316	569	675	180	005	780	307	56
5	339	919	973	306	595	664	207	91994	806	295	55
6	366	909	36000	295	622	653	234	982	833	283	54
7	34393	93899	36027	93285	37649	92642	39260	91971	40860	91272	53
8	421	889	054	274	676	631	287	959	880	260	52
9	448	879	081	264	703	620	314	948	913	248	51
10	475	869	108	253	730	609	341	936	939	236	50
11	503	859	135	243	757	598	367	925	966	224	49
12	530	849	162	232	784	587	394	914	992	212	48
13	34557	93839	36190	93222	37811	92576	39421	91902	41019	91200	47
14	584	829	217	211	838	565	448	891	045	188	46
15	612	819	244	201	865	554	474	879	072	176	45
16	639	809	271	190	892	543	501	868	098	164	44
17	666	799	298	180	919	532	528	856	125	152	43
18	694	789	325	169	946	521	535	805	151	140	42
19	34721	93779	36352	93159	37973	92510	39581	91833	41178	91128	41
20	748	769	379	148	999	499	608	822	204	116	40
21	775	759	406	137	38026	488	635	810	231	104	39
22	803	748	433	127	053	477	661	799	257	092	38
23	830	738	461	116	080	466	688	787	284	080	37
24	857	728	488	106	107	455	715	775	310	068	36
25	34884	93718	36515	93095	38134	92444	39741	91764	41337	91056	35
26	912	708	542	084	161	432	768	752	363	044	34
27	939	698	569	074	188	421	795	741	390	032	33
28	960	688	596	063	215	410	822	729	416	020	32
29	993	677	623	[illegible]	241	399	848	718	443	008	31
30	35021	667	650	042	268	388	875	706	469	90996	30
31	35048	93657	36677	93031	38295	92377	39902	91694	41496	90984	29
32	075	647	704	020	322	366	928	683	522	972	28
33	102	637	731	010	349	355	955	671	549	960	27
34	130	626	758	92999	376	343	982	660	575	948	26
35	157	616	785	988	403	332	40008	648	602	936	25
36	184	606	812	978	430	321	035	636	628	924	24
37	35211	93596	36839	92967	38456	92310	40062	91625	41655	90911	23
38	239	585	867	956	483	299	088	613	681	899	22
39	266	575	894	945	510	287	115	601	707	887	21
40	293	565	921	935	537	276	141	590	734	875	20
41	320	555	948	924	564	265	168	578	760	863	19
42	347	544	975	913	591	254	195	566	787	851	18
43	35375	93534	37002	92902	38617	92243	40221	91555	41813	90839	17
44	402	524	029	892	644	231	248	543	840	826	16
45	429	514	056	881	671	220	275	531	866	814	15
46	456	503	083	870	698	209	301	519	892	802	14
47	483	493	110	859	725	198	328	508	919	790	13
48	511	483	137	849	752	186	355	496	945	778	12
49	35538	93472	37164	92835	38778	92175	40381	91484	41972	90766	11
50	565	462	191	827	805	164	408	472	998	753	10
51	592	452	218	816	832	152	434	461	42024	741	9
52	619	441	245	805	859	141	461	449	051	729	8
53	647	431	272	794	886	130	488	437	077	717	7
54	674	420	299	784	912	119	514	425	104	704	6
55	35701	93410	37326	92773	38939	92107	40541	91414	42130	90692	5
56	728	400	353	762	966	096	567	402	156	680	4
57	755	389	380	751	993	085	594	390	183	668	3
58	782	379	407	740	39020	073	621	378	209	655	2
59	810	368	434	729	046	062	647	366	235	643	1
	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	
	69		68		67		66		65		

A Table of Natural Sines.

	25		26		27		28		29		
M.	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	M.
0	42262	90631	43837	89879	45399	89101	46947	88295	48489	87462	60
1	288	618	863	867	425	087	973	281	506	448	59
2	315	606	889	854	451	074	999	267	532	434	58
3	341	594	916	841	477	061	47024	254	557	420	57
4	367	582	942	828	503	048	050	240	583	406	56
5	394	569	968	816	529	035	076	226	608	391	55
6	420	557	994	803	554	021	101	213	634	377	54
7	42446	90545	44020	89790	45580	89008	47127	88199	48659	87363	53
8	473	532	046	777	606	88995	153	185	684	349	52
9	499	520	072	764	632	981	178	172	710	335	51
10	545	507	098	752	658	968	204	158	735	321	50
11	552	495	124	739	684	955	229	144	761	306	49
12	578	483	151	726	710	942	255	130	786	292	48
13	42604	90470	44177	89713	45736	88928	47281	88117	48811	87278	47
14	631	458	203	700	762	915	306	103	837	264	46
15	657	446	229	687	787	902	332	089	862	250	45
16	683	433	255	674	813	888	358	075	888	235	44
17	709	421	281	662	839	875	383	062	913	221	43
18	736	408	307	649	865	862	409	048	938	207	42
19	42762	90396	44333	89636	45891	88848	47434	88034	48964	87193	41
20	788	383	359	623	917	835	460	020	989	178	40
21	815	371	385	610	942	822	486	006	49014	164	39
22	841	358	411	597	968	808	511	87993	040	150	38
23	867	346	437	584	994	795	537	979	065	136	37
24	894	334	464	571	46020	782	562	965	090	121	36
25	42920	90321	44490	89558	46046	88768	47588	87951	49116	87107	35
26	946	309	516	545	072	755	614	937	141	093	34
27	972	296	542	532	097	741	639	923	166	079	33
28	999	284	568	519	123	728	665	909	192	064	32
29	43025	271	594	506	149	715	690	896	217	050	31
30	051	259	620	493	175	701	716	882	242	036	30
31	43077	90246	44646	89480	46201	88688	47741	87868	49268	87021	29
32	104	233	672	467	226	674	767	854	293	007	28
33	130	221	698	454	252	661	793	840	318	86993	27
34	156	208	724	441	278	647	818	826	344	978	26
35	182	196	750	428	304	634	844	812	369	964	25
36	209	183	776	415	330	620	869	798	394	949	24
37	43235	90171	44802	89402	46355	88607	47895	87784	49419	86935	23
38	261	158	828	389	381	593	920	770	445	921	22
39	287	146	854	376	407	580	946	756	470	906	21
40	313	133	880	363	433	566	972	743	495	892	20
41	340	120	906	350	458	553	997	729	521	878	19
42	366	108	932	337	484	539	48022	715	546	863	18
43	43392	90095	44958	89324	46510	88526	48048	87701	49571	86849	17
44	418	082	984	311	536	512	073	687	596	834	16
45	445	070	45010	298	561	499	099	673	622	820	15
46	471	057	036	285	587	485	124	659	647	805	14
47	497	045	062	272	613	472	150	645	672	791	13
48	523	032	088	259	639	458	175	631	696	777	12
49	43549	90019	45114	89245	46664	88445	48201	87617	49723	86762	11
50	575	007	140	232	690	431	226	603	748	748	10
51	602	89994	166	219	716	417	252	589	773	733	9
52	628	981	192	206	742	404	277	575	798	719	8
53	654	968	218	193	767	390	303	560	824	704	7
54	680	956	243	180	793	377	328	546	849	690	6
55	43706	89943	45269	89167	46819	88363	48354	87532	49874	86675	5
56	732	930	295	153	844	349	379	518	899	661	4
57	759	918	321	140	870	336	405	504	924	646	3
58	785	905	347	127	896	322	430	490	950	632	2
59	811	892	373	114	921	308	456	476	975	617	1
	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	
	64		63		62		61		60		

A Table of Natural Sines,

	30		31		32		33		34		
M.	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	M.
0	50000	86603	51504	85717	52992	84805	54464	83867	55919	82904	60
1	025	588	529	702	53017	789	488	851	943	887	59
2	050	573	554	687	041	774	513	835	968	871	58
3	076	559	579	672	066	759	537	819	992	855	57
4	101	544	604	657	091	743	561	804	56016	839	56
5	126	530	628	642	115	728	586	788	040	822	55
6	151	515	653	627	140	712	610	772	064	806	54
7	50176	86501	51678	85612	53164	84697	54635	83756	56088	82790	53
8	201	486	703	597	189	681	659	740	112	773	52
9	227	471	728	582	214	666	683	724	136	757	51
10	252	457	753	567	238	650	708	708	160	741	50
11	277	442	778	551	263	635	732	692	184	724	49
12	302	427	803	536	288	619	756	676	208	708	48
13	50327	86413	51828	85521	53312	84604	54781	83660	56232	82692	47
14	352	398	852	506	337	588	805	645	256	675	46
15	377	384	877	491	361	573	829	629	280	659	45
16	403	369	902	476	386	557	854	613	305	643	44
17	428	354	927	461	411	542	878	597	329	626	43
18	453	340	952	446	435	526	902	581	353	610	42
19	50478	86325	51977	85431	53460	84511	54926	83565	56377	82593	41
20	503	310	52002	416	484	495	951	549	401	577	40
21	528	295	026	401	509	480	975	533	425	561	39
22	553	281	051	385	534	464	999	517	449	544	38
23	578	266	076	370	558	448	55024	501	473	528	37
24	603	251	101	355	583	433	048	485	497	511	36
25	50628	86237	52126	85340	53607	84417	55072	83469	56521	82445	35
26	654	222	151	325	632	402	097	453	545	478	34
27	679	207	175	310	656	386	121	437	569	462	33
28	704	192	200	294	681	370	145	421	593	446	32
29	729	178	225	279	705	355	169	405	617	429	31
30	754	163	250	264	730	339	194	389	641	413	30
31	50779	86148	52275	85249	53754	84324	55218	83373	56665	82396	29
32	804	133	299	234	779	308	242	356	689	380	28
33	829	119	324	218	804	292	266	340	713	363	27
34	854	104	349	203	828	277	291	324	736	347	26
35	879	089	374	188	853	261	315	308	760	330	25
36	904	074	398	173	877	245	339	292	784	314	24
37	50929	86059	52423	85157	53902	84230	55363	83276	56808	82297	23
38	954	045	448	142	926	214	388	260	832	281	22
39	979	030	473	127	951	198	412	244	856	264	21
40	51004	015	498	112	975	182	436	228	880	248	20
41	029	000	522	096	54000	167	460	212	904	231	19
42	054	85985	547	081	024	151	484	195	928	214	18
43	51079	85970	52572	85066	54049	84135	55509	83179	56952	82198	17
44	104	956	597	051	073	120	533	163	976	181	16
45	129	941	621	035	097	104	557	147	57000	165	15
46	154	926	646	020	122	088	581	131	024	148	14
47	179	911	671	005	146	072	605	115	047	132	13
48	204	896	696	84989	171	057	630	098	071	115	12
49	51229	85881	52720	84974	54195	54041	55654	83082	57095	82098	11
50	254	866	745	959	220	025	678	066	119	082	10
51	279	851	770	943	244	009	702	050	143	065	9
52	304	836	794	928	269	83994	726	034	167	048	8
53	329	821	819	913	293	978	750	017	191	032	7
54	354	806	844	897	317	962	775	001	215	015	6
55	379	85792	52869	84882	54342	83946	55799	82985	57238	81999	5
56	404	777	893	866	366	930	823	969	262	982	4
57	429	762	918	851	391	915	847	953	286	965	3
58	454	747	943	836	415	899	871	936	310	949	2
59	479	732	967	820	439	883	895	920	334	932	1
	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	
	59		58		57		56		55		

A Table of Natural Sines.

	35		36		37		38		39		
M.	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	M.
0	57358	81915	58779	80902	60181	79864	61566	78801	62932	77715	60
1	381	899	802	885	205	846	589	783	955	696	59
2	405	882	826	867	228	829	612	765	977	678	58
3	429	865	849	850	251	811	635	747	63000	660	57
4	453	848	873	833	274	793	658	729	022	641	56
5	477	832	896	816	298	776	681	711	045	623	55
6	501	815	920	799	321	758	704	693	068	605	54
7	57524	81798	58943	80782	60344	79741	81726	78676	63090	77586	53
8	548	781	967	765	367	723	749	658	113	568	52
9	572	765	990	748	390	706	772	640	135	550	51
10	596	748	59014	730	414	688	795	622	158	531	50
11	619	731	037	713	437	671	818	604	180	513	49
12	643	714	061	696	460	653	841	586	203	494	48
13	57667	81698	59084	80679	60483	79635	61864	78568	63225	77476	47
14	691	681	107	662	506	618	887	550	248	458	46
15	715	664	131	644	529	600	909	532	271	439	45
16	738	647	154	627	553	583	932	514	293	421	44
17	762	631	178	610	576	565	955	496	316	402	43
18	786	614	201	593	599	547	978	478	338	384	42
19	57809	81597	59225	80576	60622	79530	62001	78460	63361	77366	41
20	833	580	248	558	645	512	024	442	383	347	40
21	857	563	272	541	668	494	046	424	406	329	39
22	881	546	295	524	691	477	069	405	428	310	38
23	904	530	318	507	714	459	092	387	451	292	37
24	929	513	342	489	738	441	115	369	473	273	36
25	57952	81496	59365	80472	60761	79424	62138	78351	63496	77255	35
26	976	479	389	455	784	406	160	333	518	236	34
27	999	462	412	438	807	388	183	315	540	218	33
28	58023	445	435	420	830	371	206	297	563	199	32
29	047	428	459	403	853	353	229	279	585	181	31
30	070	412	482	386	876	335	251	261	608	162	30
31	58094	81395	59506	80368	60899	79318	62274	78243	63630	77144	29
32	118	378	529	351	922	300	297	225	653	125	28
33	141	361	552	334	945	282	320	206	675	107	27
34	165	344	576	316	968	264	342	188	698	088	26
35	189	327	599	299	991	247	365	170	720	070	25
36	212	310	622	282	61015	229	388	152	742	051	24
37	58236	81293	59646	80264	61038	79211	62411	78134	63765	77033	23
38	260	276	669	247	061	193	433	116	787	014	22
39	283	259	693	230	084	176	456	098	810	76996	21
40	307	242	716	212	107	158	479	079	832	977	20
41	330	225	739	195	130	140	502	061	854	959	19
42	354	208	763	178	153	122	524	043	877	940	18
43	58378	81191	59786	80160	61176	79105	62547	78025	63899	76921	17
44	401	174	809	143	199	087	570	007	922	903	16
45	425	157	832	125	222	069	592	77988	944	884	15
46	449	140	856	108	245	051	615	970	966	866	14
47	472	123	879	091	268	033	638	952	989	847	13
48	496	106	902	073	291	015	660	934	64011	828	12
49	58519	81089	59926	80056	61314	78998	62683	77916	64033	76810	11
50	543	072	949	038	337	980	706	897	056	791	10
51	567	055	972	021	360	962	728	879	078	772	9
52	590	038	995	003	383	944	751	861	100	754	8
53	614	021	60019	79986	406	926	774	843	123	735	7
54	637	004	042	968	429	908	796	824	145	717	6
55	58661	80987	60065	79951	61451	78891	62819	77806	64167	76698	5
56	684	970	089	934	474	873	842	788	190	679	4
57	708	953	112	916	497	855	864	769	212	661	3
58	731	936	135	899	520	837	887	751	234	642	2
59	755	919	158	881	543	819	909	732	256	623	1
	N.Coſ	N.ſine	N.Coſ	N.ſine	NCoſ	N.ſine	NCoſ	N.ſine	N.Coſ	Nſine	
	54		53		52		51		50		

A Table of Natural Sines.

	40		41		42		43		44		
M.	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	M.
0	64279	76604	65606	75471	66913	74314	68200	73135	69466	71934	60
1	301	586	628	452	935	295	221	116	487	914	59
2	323	567	650	433	956	276	242	096	508	894	58
3	346	548	672	314	978	256	264	076	529	873	57
4	368	530	694	395	999	237	285	056	549	853	56
5	390	511	715	375	67021	217	306	036	570	833	55
6	412	492	738	356	043	198	327	016	592	813	54
7	64435	76473	65759	75337	67064	74178	68349	72996	69612	71792	53
8	457	455	781	318	086	159	370	976	633	772	52
9	479	436	803	299	107	139	391	957	654	752	51
10	501	417	825	280	129	120	412	937	675	732	59
11	524	398	847	261	151	100	433	917	696	711	49
12	546	380	869	241	172	080	455	897	717	691	48
13	64568	76361	65891	75222	67194	74061	68476	72877	69737	71671	47
14	590	342	913	203	215	041	497	857	758	650	46
15	612	323	935	184	237	022	518	837	779	630	45
16	635	304	956	165	258	002	539	817	800	610	44
17	657	286	978	146	280	73983	561	797	821	590	43
18	679	267	66000	126	301	963	582	777	842	569	42
19	64701	76248	66022	75107	67323	73944	68603	72757	69862	71549	41
20	723	229	044	088	344	924	624	737	883	529	40
21	746	210	066	069	366	904	645	717	904	508	39
22	768	192	088	050	387	885	666	697	925	488	38
23	790	173	109	030	409	865	688	677	946	468	37
24	812	154	131	011	430	846	709	657	966	447	36
25	64834	76135	66153	74992	67452	73826	68730	72637	69987	71427	35
26	856	116	175	973	473	806	751	617	70008	407	34
27	878	097	197	953	495	787	772	597	029	386	33
28	901	078	218	934	516	767	793	577	049	366	32
29	923	059	240	915	538	747	814	557	070	345	31
30	945	041	262	896	559	728	835	537	091	325	30
31	64967	76022	66284	74876	67580	73708	68857	72517	70112	71305	29
32	989	003	306	857	602	688	878	497	132	284	28
33	65011	75984	327	838	623	669	899	477	153	264	27
34	033	965	349	818	645	649	920	457	174	243	26
35	055	946	371	799	666	629	941	437	195	223	25
36	077	927	393	780	688	610	962	417	215	203	24
37	65099	75908	66414	74760	67709	73590	68983	72397	70236	71182	23
38	122	889	436	741	730	570	69004	377	257	162	22
39	144	870	458	722	752	551	025	357	277	141	21
40	166	851	480	703	773	531	046	337	298	121	20
41	188	832	501	683	795	511	067	317	319	100	39
42	210	813	523	664	816	491	088	297	339	080	18
43	65232	75794	66545	74644	67837	73472	69109	72277	70360	71059	17
44	254	775	566	625	859	452	130	257	381	039	16
45	276	756	588	606	880	432	151	236	401	019	15
46	298	738	610	586	901	412	172	216	422	70998	14
47	320	719	632	567	923	393	193	196	443	978	13
48	342	699	653	548	944	373	214	176	463	957	12
49	64364	75680	66675	74528	67965	73353	69235	72156	70484	70937	11
50	386	661	697	509	987	333	256	136	505	916	10
51	408	642	718	489	68008	314	277	116	525	896	9
52	430	623	740	470	029	294	298	095	546	875	8
53	452	604	762	451	051	275	319	075	567	855	7
54	474	585	783	431	072	254	340	055	587	834	6
55	65496	75566	66805	74412	68093	73234	69361	72035	70608	70713	5
56	518	547	827	392	115	215	382	015	628	793	4
57	540	528	848	373	136	195	403	71995	649	772	3
58	562	509	870	353	157	175	424	974	670	752	2
59	583	490	891	334	179	155	445	954	690	731	1
	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	
	49		48		47		46		45		

A TABLE ſhewing the Time of the Sun, Moon, and Star's Setting, when they have North Declination, or the Time of their Riſing, when they have South Declination.

DEGREES OF DECLINATION.

Lat.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	2329	Lat.
	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	
1°	6.00	6.00	6.0	6.00	6.00	6.00	6.00	6.00	6.00	6.01	6.01	6.01	6.01	6.01	6.01	6.01	6.01	6.01	6.01	6.01	6.01	6.02	6.02	6.02	6.02	1°
2	6.00	6.00	6.0	6.00	6.00	6.00	6.01	6.01	6.01	6.01	6.01	6.01	6.02	6.02	6.02	6.02	6.02	6.02	6.03	6.03	6.03	6.03	6.03	6.03	6.04	2
3	6.00	6.00	6.0	6.01	6.01	6.01	6.01	6.01	6.02	6.02	6.02	6.02	6.02	6.03	6.03	6.03	6.03	6.04	6.04	6.04	6.04	6.05	6.05	6.05	6.05	3
4	6.00	6.00	6.0	6.01	6.01	6.01	6.02	6.02	6.02	6.03	6.03	6.03	6.03	6.04	6.04	6.04	6.05	6.05	6.05	6.05	6.06	6.06	6.06	6.07	6.07	4
5	6.00	6.00	6.01	6.01	6.01	6.02	6.02	6.02	6.03	6.03	6.04	6.04	6.04	6.05	6.05	6.05	6.06	6.06	6.07	6.07	6.07	6.08	6.08	6.09	6.09	5
6	6.00	6.00	6.01	6.01	6.02	6.02	6.03	6.03	6.03	6.04	6.04	6.05	6.05	6.06	6.06	6.06	6.07	6.07	6.08	6.08	6.09	6.09	6.10	6.10	6.11	6
7	6.00	6.00	6.01	6.01	6.02	6.02	6.03	6.03	6.04	6.04	6.05	6.05	6.06	6.06	6.07	6.08	6.08	6.09	6.09	6.10	6.10	6.11	6.11	6.12	6.12	7
8	6.00	6.00	6.01	6.02	6.02	6.03	6.03	6.04	6.04	6.05	6.06	6.06	6.07	6.07	6.08	6.09	6.09	6.10	6.10	6.11	6.12	6.12	6.13	6.14	6.14	8
9	6.00	6.1	6.01	6.02	6.02	6.03	6.04	6.04	6.05	6.06	6.06	6.07	6.08	6.08	6.09	6.10	6.10	6.11	6.12	6.13	6.14	6.14	6.15	6.15	6.16	9
10	6.00	6.1	6.01	6.02	6.03	6.04	6.04	6.05	6.06	6.06	6.07	6.08	6.09	6.09	6.10	6.11	6.12	6.12	6.13	6.14	6.15	6.16	6.16	6.17	6.17	10
11	6.00	6.1	6.02	6.02	6.03	6.04	6.05	6.05	6.06	6.07	6.08	6.09	6.09	6.10	6.11	6.12	6.13	6.14	6.14	6.15	6.16	6.17	6.18	6.19	6.19	11
12	6.00	6.1	6.02	6.03	6.04	6.04	6.05	6.06	6.07	6.08	6.09	6.09	6.10	6.11	6.12	6.13	6.14	6.15	6.16	6.17	6.18	6.19	6.20	6.21	6.21	12
13	6.00	6.1	6.02	6.03	6.04	6.05	6.06	6.06	6.07	6.08	6.09	6.10	6.11	6.12	6.13	6.14	6.15	6.16	6.17	6.18	6.19	6.20	6.21	6.22	6.23	13
14	6.00	6.1	6.02	6.03	6.04	6.05	6.06	6.07	6.08	6.09	6.10	6.11	6.12	6.13	6.14	6.15	6.16	6.17	6.19	6.20	6.21	6.22	6.23	6.24	6.25	14
15	6.00	6.1	6.02	6.03	6.04	6.05	6.06	6.07	6.09	6.10	6.11	6.12	6.13	6.14	6.15	6.16	6.18	6.19	6.20	6.21	6.22	6.24	6.25	6.26	6.27	15
16	6.00	6.1	6.02	6.03	6.05	6.06	6.07	6.08	6.09	6.10	6.12	6.13	6.14	6.15	6.16	6.18	6.19	6.20	6.21	6.23	6.24	6.25	6.27	6.28	6.29	16
17	6.00	6.1	6.02	6.04	6.05	6.06	6.07	6.09	6.10	6.12	6.12	6.13	6.15	6.16	6.17	6.19	6.20	6.21	6.23	6.24	6.25	6.27	6.28	6.30	6.31	17
18	6.00	6.1	6.02	6.04	6.05	6.06	6.08	6.09	6.10	6.13	6.13	6.14	6.16	6.17	6.19	6.20	6.21	6.22	6.24	6.26	6.27	6.29	6.30	6.32	6.33	18
19	6.00	6.1	6.03	6.04	6.05	6.07	6.08	6.10	6.11	6.13	6.14	6.15	6.17	6.18	6.20	6.21	6.23	6.24	6.26	6.27	6.28	6.30	6.31	6.33	6.34	19
20	6.00	6.1	6.03	6.04	6.06	6.17	6.09	6.10	6.12	6.14	6.15	6.16	6.18	6.19	6.21	6.22	6.24	6.25	6.27	6.29	6.30	6.32	6.33	6.35	6.36	20
21	6.00	6.1	6.03	6.05	6.06	6.18	6.09	6.11	6.12	6.14	6.16	6.17	6.19	6.20	6.22	6.24	6.25	6.27	6.29	6.30	6.32	6.34	6.35	6.37	6.38	21
22	6.00	6.2	6.03	6.05	6.06	6.08	6.10	6.11	6.13	6.15	6.16	6.18	6.20	6.21	6.23	6.25	6.27	6.28	6.30	6.32	6.34	6.36	6.37	6.39	6.40	22
23	6.00	6.2	6.03	6.05	6.07	6.09	6.10	6.12	6.14	6.15	6.17	6.19	6.21	6.23	6.24	6.26	6.28	6.30	6.32	6.34	6.36	6.37	6.39	6.41	6.42	23
24	6.00	6.2	6.03	6.05	6.07	6.09	6.11	6.13	6.14	6.16	6.18	6.20	6.22	6.24	6.25	6.27	6.29	6.31	6.33	6.35	6.37	6.39	6.41	6.43	6.44	24
25	6.00	6.2	6.04	6.06	6.07	6.09	6.11	6.13	6.15	6.17	6.19	6.21	6.23	6.25	6.27	6.29	6.31	6.33	6.35	6.37	6.39	6.41	6.43	6.46	6.47	25
26	6.00	6.2	6.04	6.06	6.08	6.10	6.12	6.14	6.16	6.18	6.20	6.22	6.24	6.26	6.28	6.30	6.31	6.34	6.36	6.39	6.41	6.43	6.45	6.48	6.49	26
27	6.00	6.2	6.04	6.06	6.08	6.10	6.12	6.14	6.16	6.19	6.21	6.23	6.25	6.27	6.29	6.31	6.34	6.36	6.38	6.40	6.42	6.45	6.48	6.50	6.51	27
28	6.00	6.2	6.04	6.06	6.09	6.11	6.13	6.15	6.17	6.19	6.22	6.24	6.26	6.28	6.30	6.33	6.35	6.37	6.40	6.42	6.45	6.47	6.50	6.52	6.53	28
29	6.00	6.2	6.04	6.07	6.09	6.11	6.13	6.16	6.18	6.20	6.23	6.25	6.27	6.29	6.32	6.34	6.37	6.39	6.42	6.44	6.47	6.49	6.52	6.54	6.55	29
30	6.00	6.2	6.05	6.07	6.09	6.12	6.14	6.16	6.19	6.21	6.23	6.26	6.28	6.31	6.33	6.36	6.38	6.41	6.43	6.46	6.48	6.51	6.54	6.57	6.58	30

A TABLE ſhewing the Time of the Sun, Moon, and Star's Setting, when they have North Declination, or the Time of their Riſing, when they have South Declination.

DEGREES OF DECLINATION.

Lat.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	23 29	Lat.
	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	
31°	6.00	6.02	6.05	6.07	6.10	6.12	6.15	6.17	6.19	6.22	6.24	6.27	6.29	6.32	6.34	6.37	6.40	6.42	6.45	6.48	6.51	6.53	6.56	6.59	7.01	31°
32	6.00	6.02	6.05	6.08	6.10	9.13	6.15	6.18	6.20	6.23	6.25	6.28	6.31	6.33	6.36	6.39	6.41	6.44	6.47	6.50	6.53	6.56	6.58	7.01	7.03	32
33	6.00	6.03	6.05	6.08	6.10	6.13	6.16	6.18	6.21	6.24	6.26	6.29	6.32	6.34	6.37	6.40	6.43	6.46	6.49	6.52	6.55	6.58	7.01	7.04	7.06	33
34	6.00	6.03	6.05	6.08	6.11	6.14	6.16	6.19	6.22	6.25	6.27	6.30	6.33	6.36	6.39	6.42	6.45	6.48	6.51	6.54	6.57	7.00	7.03	7.06	7.08	34
35	6.00	6.03	6.06	6.08	6.11	6.14	6.17	6.20	6.23	6.25	6.28	6.31	6.34	6.37	6.40	6.43	6.46	6.49	6.53	6.56	6.59	7.02	7.06	7.09	7.11	35
36	6.00	6.03	6.06	6.09	6.12	6.15	6.18	6.20	6.23	6.26	6.29	6.32	6.36	6.39	6.42	6.45	6.48	6.51	6.55	6.58	7.01	7.05	7.08	7.12	7.14	36
37	6.00	6.03	6.06	6.09	6.12	6.15	6.18	6.21	6.24	6.27	6.31	6.34	6.37	6.40	6.43	6.47	6.50	6.53	6.57	7.00	7.04	7.07	7.11	7.15	7.17	37
38	6.00	6.03	6.06	6.09	6.13	6.16	6.19	6.22	6.25	6.28	6.32	6.35	6.38	6.42	6.45	6.48	6.52	6.55	6.59	7.02	7.06	7.10	7.14	7.17	7.19	38
39	6.00	6.03	6.06	6.10	6.13	6.16	6.20	6.22	6.26	6.29	6.32	6.36	6.40	6.43	6.47	6.50	6.54	6.57	7.01	7.05	7.09	7.12	7.16	7.20	7.22	39
40	6.00	6.03	6.07	6.10	6.13	6.17	6.20	6.24	6.27	6.31	6.34	6.38	6.41	6.45	6.48	6.52	6.56	7.00	7.03	7.07	7.11	7.15	7.19	7.23	7.25	40
41	6.00	6.03	6.07	6.10	6.14	6.17	6.21	6.25	6.28	6.32	6.35	6.39	6.43	6.46	6.50	6.54	6.58	7.02	7.06	7.10	7.14	7.18	7.22	7.27	7.29	41
42	6.00	6.04	6.07	6.11	6.14	6.18	6.22	6.25	6.29	6.33	6.37	6.40	6.44	6.48	6.52	6.56	7.00	7.04	7.08	7.12	7.17	7.21	7.25	7.30	7.32	42
43	6.00	6.04	6.07	6.11	6.15	6.19	6.22	6.26	6.30	6.34	6.38	6.42	6.46	6.50	6.54	6.58	7.02	7.06	7.11	7.15	7.19	7.24	7.28	7.33	7.36	43
44	6.00	6.04	6.08	6.12	6.15	6.19	6.23	6.27	6.31	6.35	6.39	6.43	6.47	6.52	6.56	7.00	7.04	7.09	7.13	7.18	7.22	7.27	7.31	7.36	7.39	44
45	6.00	6.04	6.08	6.12	6.16	6.20	6.24	6.28	6.32	6.36	6.41	6.45	6.49	6.53	6.58	7.02	7.07	7.11	7.16	7.21	7.25	7.30	7.35	7.40	7.43	45
46	6.00	6.04	6.08	6.12	6.17	6.21	6.25	6.29	6.33	6.38	6.42	6.46	6.51	6.55	7.00	7.04	7.09	7.14	7.19	7.24	7.29	7.34	7.39	7.44	7.47	46
47	6.00	6.04	6.09	6.13	6.17	6.22	6.26	6.30	6.35	6.39	6.43	6.48	6.53	6.57	7.02	7.07	7.12	7.17	7.22	7.27	7.32	7.37	7.43	7.48	7.51	47
48	6.00	6.04	6.09	6.13	6.18	6.22	6.27	6.31	6.36	6.41	6.45	6.50	6.55	6.59	7.04	7.09	7.14	7.19	7.25	7.30	7.35	7.41	7.47	7.53	7.56	48
49	6.00	6.05	6.09	6.14	6.18	6.23	6.28	6.32	6.37	6.42	6.47	6.52	6.57	7.02	7.07	7.12	7.17	7.22	7.28	7.33	7.40	7.45	7.51	7.57	8.00	49
50	6.00	6.05	6.10	6.14	6.19	6.24	6.29	6.34	6.39	6.44	6.49	6.54	6.59	7.04	7.09	7.14	7.20	7.25	7.31	7.37	7.43	7.49	7.55	8.02	8.05	50
51	6.00	6.05	6.10	6.15	0.20	6.25	6.30	6.35	6.40	6.45	6.50	6.56	7.01	7.06	7.12	7.17	7.23	7.29	7.35	7.41	7.47	7.53	8.00	8.06	8.10	51
52	6.00	6.05	6.10	6.15	6.21	6.26	6.31	6.36	6.41	6.47	6.52	6.58	7.03	7.09	7.14	7.20	7.26	7.32	7.38	7.45	7.51	7.58	8.05	8.12	8.16	52
53	6.00	6.05	6.11	6.16	6.21	6.27	6.32	6.38	6.43	6.49	6.54	7.00	7.06	7.11	7.17	7.23	7.29	7.36	7.42	7.49	7.56	8.03	8.10	8.17	8.21	53
54	6.00	6.06	6.11	6.17	6.22	6.28	6.33	6.39	6.45	6.50	6.56	7.02	7.08	7.14	7.20	7.27	7.33	7.40	7.46	7.52	8.00	8.08	8.15	8.23	8.27	54
55	6.00	6.06	6.11	6.17	6.23	6.29	6.35	6.40	6.46	6.52	6.58	7.04	7.11	7.17	7.23	7.30	7.37	7.44	7.51	7.58	8.05	8.13	8.21	8.29	8.33	55
56	6.00	6.06	6.12	6.18	6.24	6.30	6.36	6.42	6.48	6.54	7.00	7.07	7.13	7.20	7.27	7.34	7.41	7.48	7.55	8.03	8.11	8.19	8.27	8.32	8.41	56
57	6.00	6.0	6.12	6.19	6.25	6.31	6.37	6.44	6.50	6.56	7.03	7.10	7.16	7.23	7.30	7.38	7.45	7.52	8.00	8.08	8.16	8.25	8.34	8.43	8.48	57
58	6.00	6.06	6.13	6.19	6.26	6.32	6.39	6.45	6.52	6.58	7.06	7.13	7.20	7.27	7.34	7.42	7.49	7.57	8.05	8.14	8.32	8.32	8.41	8.51	8.56	58
59	6.00	6.07	6.13	6.20	6.27	6.33	6.40	6.47	6.54	7.01	7.08	7.16	7.23	7.30	7.38	7.46	7.54	8. 8	8.11	8.20	8.29	8.39	8.49	9.00	9.05	59
60	6.00	6.07	6.14	6.21	6.28	6.33	6.42	6.49	6.56	7.03	7.11	7.19	7.26	7.34	7.42	7.51	7.59	8. 8	8.17	8.26	8.36	8.47	8.58	9.09	9.16	60

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To find the Time of the Sun's Riſing, Setting, and Length of the Day and Night, by theſe Tables.

Firſt. Find the Sun's Declination at the Top of the Page (marked with the Degrees of Declination) and the Latitude in the Right, or Left Hand Columns (marked Lat.) and in the common Angle of Meeting is the Time of Sun ſetting, if the Sun has North Declination, but the Time of Sun riſing, if the Sun has South Declination.

EXAMPLE I.

Let it be required to find the Time of the Sun's Riſing and Setting, with the Length of the Day and Night, in Latitude 51° North, the 18th of July, 1784?

I firſt ſee the Sun's Declination for the given Day, and find it 20° 55′ North, which I here call 21°, then under the Declination 21, and againſt the Latitude 51°, ſtands 7 Hours, 53 Minutes, the Time the Sun ſets on the given Day, in Lat. 51 North, which being doubled, gives 15 Hours, 46 Minutes, the Length of the Day; and, if 7 Hours, 53 Minutes the Time of Sun-ſetting be ſubtracted from 12 Hours, the Remainder 4 Hours, 7 Minutes, gives the Time of the Sun's Riſing, which being doubled, gives 8 Houts, 14 Minutes Length of the Night.

But, when the Sun has 21° South Declination in this Latitude, the Time of Sun Setting becomes the Time of Sun Riſing, and the Length of the Day will then become the Length of the Night.

Thus, the 25th of November, 1784, the Sun's Declination is 20° 57′ South, or 21°, then the Time of Sun Riſing is 7 Houts 53 Minutes, his Setting 4 Hours, 7 Minutes, and the the Length of the Night 15 Hours, 46 Minutes, and Day 8 Hours, 14 Minutes.

EXAMPLE II.

Let it be required to find the Time of the Sun's Riſing, Setting, and Length of the Day and Night, at Peterſburg, the 21ſt June 1788.

Under 23° 28′ N. the Declination that Day, and againſt 60° North, the Latitude of Peterſburgh.	12	0
Stands the Sun's Setting	9	19
The Time of Sun Riſing	2	41
Sun Setting doubled is the Leng. of Day	18	38
Sun Riſing doubled is the Len. of Night	5	42

EXAMPLE III.

Required the Time of the Sun's Riſing and Setting, and Length of the Day at the Cape of Good Hope, in Lat. 34.22S. the 15th of May, 1784.

Under the Declination 19°4′ or 19°,N. and againſt the Lat. 34 S.	12	0
Stands the Sun's Riſing	6	53
Time of Sun's Setting	5	7
The Length of the Day	10	14
And 6 H. 53 M. doub. is Len. of Night	3	46

When a greater Degree of Accuracy is required, proportional Parts may be taken for Degrees and Minutes of Latitude and Declination.

To find the Riſing and Setting of the Stars.

By theſe Tables the Riſing and Setting of any Star may be found, whoſe Declination does not exceed 23° 30′ North or South in the following Manner.

If you are in North Latitude, and the Star has North Declination, look for the Declination at the Top, and the Latitude in the Right or Left Hand Columns, in the Angle of Meeting, is Half the Time of the Stars continuance above the Horizon, in that Latitude; or the Time it takes in Aſcending from the Eaſtern Side of the Horizon to the Meridian, and Deſcending from the Meridian to the Weſtern Part of the Horizon.

Therefore, if theſe Hours and Minutes be ſubtracted from the Time of the Star's coming to the Meridian, the Remainder will be the Time of the Star's Riſing, and if added, the Sum will be the Time of the Star's Setting

EXAMPLE I.

Required when the Star Arcturus Riſes and Sets December 1, in Lat. 51° N.

The Time of the Star's coming to the Meridian, or Southing in the Morning	9	34
Then under Star's Declination 20° 2′ or 20° N. and againſt Lat. 51 ſtands	7	47
Time of Star's Riſing in the Morning	1	47
	17	21
	12	
Star Sets 21 Minutes after 5 in the Evening	5	21

When the Latitude is North, and the Star has South Declination, or the Latitude South and the Star has North Declination; find the Latitude in the ſide Columns as before, againſt which, and under the Degrees of Declination, ſtands Half the Time the Star is under the Horizon, which being ſubtracted from 12, the Remainder will be Half the Time the Star will be above the Horizon in that Latitude.

Example. What Time will the Dog Star, Sirius, Riſe and Set at London, January 25.

	12	0
Under the Declination 16° 25′ S. and againſt Lat. 51° 32′ ſtands	7	26
Half the Time the Star is above the Horizon	4	34
The Star comes to the Meridian in the Evening, at	10	00
Which Subtracted, ſhews that the Star Riſes at 26 M. after 5 In the Evening	5	26
Added, ſhews the Time the Star ſets in the Morning	2	34

In like Manner may the Riſing and Setting of the Planets be found when their Declination does not exceed 23° ½, and the Time of their Paſſage over the Meridian is known.

Suppoſe it were required to know the Time of Jupiter's Riſing and Setting, in Latitude 52 North, the 1ſt of October 1786?

In the Nautical Almanac for 1786, I find that Jupiter paſſes over the Meridian of Greenwich at 14 H. 41 M. that is 41 M. after 2, next Morning on the given Day, and his Declination is 16° 40′N.

Now, 12 H. added to 14 H, 41 M. is 26 H. 41 M. from which ſubtract 24 H. and the Remainder 2 H. 41 M. is the Time of his paſſing the Meridian on the Morning of that Day according to the civil Account.

Under Declination 16° 40′ or 17° and againſt Lat. 52° ſtand 7 H. 32 M. half the Time Jupiter is above the Horizon, this doubled is 15 H. 4 M. the Length of Jupiter's Day, which ſubtracted from 24 H. gives 8 H. 56 M. the Length of his Night.

Again, 7 H. 32 M. added to his paſſing the Meridian 2 H. 41 M. gives 10 H. 13 M. his ſetting in the Morning, and 2 H. 41 Minutes added to 12 H. gives 14 H. 41 Minutes, from this Sum take 7 H. 32 M. and the Remainder 7 H. 9 M. is the Time of his Riſing in the Evening.

Suppoſe it were required to find the Moon's Riſing and Setting September the 3d, 1786, in Lat. 52° North?

In the Nautical Almanac, (page 6th) I find that the Moon paſſes the Meridian of Greenwich at 8 H. 12 M. in the Evening, and her Declination at Midnight is 22° 55′ South.

Then in the Tables, under the Declination 22° 55′ or 23°, and againſt the Lat. 52° ſtands 8 H. 12 M. Half the Time ſhe is under the Horizon, doubled is 16 H. 24 M. the Length of the Lunar Night, which ſubtracted from 24 H. leaves 7 Hours 36 M. the Lunar Day. To the Moon's Southing or Paſſage over the Meridian, 8 H. 12 M. add half the Lunar Day 3 H. 48 M. gives 12, her ſetting at Midnight, and from 8 H. 12 M. take 3, 48 the Remainder, 4 H. 24 M. is the Time of her Riſing in the Afternoon.

In like Manner may be found the Riſing and Setting of the other Planets, only obſerving, that the Noon of the common Day, and end of the Sea Day, is the beginning of the Day in the Nautical Almanack.

As all the Calculations here are made for the Meridian of London, or Greenwich, therefore Care muſt be taken to reduce the Time of their Paſſages over the Meridian of Greenwich, to the Meridian of the Place of Obſervation, by allowing 1 H. later for every 15° of Weſt Longitude, and 1 H. ſooner for every 15° of Eaſt Longitude.

It were to be wiſhed, that Gentlemen belonging to the Sea, would carry a celeſtial Globe with them, upon which all the above may be found in an eaſy Manner; for they would have nothing more to do but to ſet the Globe North and South, raiſe the Pole as many Degrees above the Horizon as the Latitude is; bring the Sun's Place to the Brazen Meridian, and ſet the Index to the upper 12, then turn the Globe round, and note what Stars come to the Meridian, and the Hour Index will point to the Time; when they come above the Horizon it will point to the Time of their Riſing, and when they deſcend below the Horizon it will point to their Setting, for as each Star on the Globe will point directly to one of the ſame Name in the Heavens, they may be viewed at any Time of the Night; or, if a Planet, turn the Globe until the Index points to the Time of their Paſſage over the Meridian, and make a Mark on the Globe with a Pencil under their Declination, then turn the Globe Eaſt until the Mark comes to the Horizon, and the Index will point to the Time of their Riſing, and turned Weſterly till it come to the Horizon, the Index will point to the Time of their Setting.

The following Hints may not be unworthy the Seaman's Notice.

The beſt Method for preventing Veſſels Anchors from coming Home.

IF you are under the Neceſſity of coming to an Anchor on a Lee-ſhore, or in any narrow Roadſted where there is deep Water, and you have the leaſt Suſpicion of the Ground being too hard or too light for good holding Ground, drop your common Riding Bower, firſt keeping 25 or 30 Fathom of Cable on board, and if you perceive by dropping the Lead over, or by the Land or any other Means that your Veſſel drags her Anchor, drop your beſt Bower, and at the ſame Time veer out the Remainder of the common Bower Cable till the beſt Bower checks her, after which bend a ſufficient Rope or Hawſer to the common Bower without the Hawſe Hole, and paſs it through another Hawſe Hole to the Wind-laſs, making it faſt, then caſt off the common Bower, and having paſſed the Cable-End thro' Hawſe-Hole, take a running Clinch with it round the beſt Bower Cable and let it go; when after you think the Veſſel has dragged her beſt Bower Anchor far enough to ſtraiten the common Cable on the Ground, you may veer out as much of the beſt Bower as you pleaſe, and though the Weather ſhould be ever ſo violent you may be aſſured ſhe will not drag them home. If your Veſſel be ſmall and rides hard in a Head Sea, nothing will aſſiſt her more than faſtening an empty Butt to the Cable, about ten Fathom from the Veſſel, by receiving the Motion of the Sea firſt, checks the Veſſel, and cauſes her to come np to the Swell, and by that Means avoid half its Force.

Of Fothering Veſſels.

Take a Studding-ſail, or ſome other ſmall Sail, mix a Quantity of Oakham and Wool together, chopped ſmall, and ſtick it in Handfuls down to the Sail as lightly as you can, and overſpread ſuch Dung and Filth as you have on Board, but if Horſe-Dung the better; the Sail being thus prepared, haul it under the Ship's Bottom by Ropes ſo faſtned to the Sail to keep it extended, the Suction which incites the rapid Entrance of the Water will draw the Compoſition from the Surface of the Sail, and force it into the Leak in ſuch Quantity, as if not wholly to ſtop it, at leaſt to keep out ſo much Water as to render the Danger trifling.

Of Veſſels running or driving on Shore.

If your Veſſel ſhould be ſo much embayed as to be obliged to bring upon a Lee-Shore, and you are apprehenſive of her parting her Cable, or being otherwiſe unable to ride the Gale out, keep her to her Anchor, if you poſſibly can, till the turn of High Water, then before you ſlip or cut get what Sails you can ready for hoiſting at a Moment's Warning. If your Ship falls head to Wind, and you think ſhe will not wear with much Sail, I preſume you will uſe your Fore-ſails only, with which Sails you may run till you have juſt Time to lower them, and hoiſt your Main Sails, (for if a Ship, and ſhe will bear her Mizen Sails only without broaching too, ſo much the better) before the Ship ſtrikes; which being done, as ſoon as you perceive by your Lead that you are near the Ground, cauſe whatever is eaſieſt to be moved to be placed on that Side of the Veſſel which will readieſt and ſafeſt become the Lee-ſide; and as ſoon as you find her near touching, lay her as nearly as you can Broadſide too, and heel her in as much as you with Safety can. In the firſt Place then, with reſpect to the keeping your Veſſel at her Anchor if poſſible, till the Turn of High Water, by ſo doing you will lay her on Shore on the young Ebb, and will have the Remainder of the Ebb, and great Part of the next Flood, to preſerve the Effects of the Veſſel; and ſhould there be any Likelihood of the Gale abating, you will have a long Ebb to carry Anchors out, in order to get your Veſſel off, to ſay nothing of her being under Water every Tide, in Caſe ſhe bulges, the natural Conſequence of a Veſſel grounding on the latter Part of an Ebb, which is of no ſmall Conſideration. In the next Place, by taking in your Head-ſails, and hoiſting

your

your Main or After-Sails, the Veſſel will ſhoot a-Head much eaſier by being eaſed of the Preſſure of her Head-ſails; and on the ſame Account, will run into Shoaler Water, and the Main or After-Sails being out, will enliven the After-part of her, and run her up with the greater Facility. By laying your Veſſel's Broadſide to the Sea, you obtain many Advantages; for inſtance, ſhould the Sea run high, your own Boats, or thoſe from the Shore, may come to your Lee-Side with the greateſt Safety, as the Length of the Veſſel will ſmooth the Water along way in, and by that Means greatly aſſiſt in ſaving the Crew. The Veſſel will dry, or nearly dry together, and permit Boats or Carriages to come along-ſide with Eaſe, at the ſame Time that the Veſſel heeling in, permits the Goods to be taken out with great Safety and Expedition, and ſhould there be an Opportunity of endeavouring to get her off, by laying Broadſide to Sea, her Head may be hove round with Eaſe, and when a-float, by heaving ſhort her Stern will lighten.

To Link worm a Cable, to prevent them from being wounded, or parting in rocky or ſtony Ground, and to defend them from the Ice.

As a Cable, though however well laid, is by no Means capable of enduring the Friction of a rocky or ſtony Bottom, I would recommend every Maſter and Commander to have three Chains, each about 15 Fathom long, all of a Size, and proportionably large, ſo that when wound round the Cable they may project ſo far without it as to receive the chief Body of Friction; let one End of each Chain be made faſt to the Ring of the Anchor, and then worm each Chain ſlightly round its reſpective Channel of the Cable, ſo as not to check it from ſtretching, faſtening the other end of each Chain to the Cable; the Chains need not be made very heavy, and the Links ſhould be ſhort, as they will then worm much eaſier; theſe Chains will receive the whole Friction and chafing of the Rocks and Stones, and will completely guard the Cable from being wounded; as they are put on in a very few Minutes there will be no Neceſſity of having them fitted on, but when there is a Probability of being obliged to bring up in a Situation where they become neceſſary; and here I cannot help ſaying that it is too probable many Veſſels have been loſt for want of a proper Attention being paid to their Cables at the Slack of the Tides, by heaving them ſhort, and veering out as the Tide ſtrengthens. On the contrary, in order to avoid a little Trouble, the Cables have been ſuffered to kink, when if the Wind has freſhened let the Cables have been ever ſo good, the firſt foul Sea that ſtruck againſt them has ſnapped them, and poſſibly before they could be brought up to other Anchors, they are driven on Shore, and much damaged, if not totally loſt. The Weight of the 3 Chains, if a large Cable, will not exceed 500 Weight, and the only trifling Difficulty which will attend carrying this Method into Practice, will be the Hawſe-Holes being perhaps too ſmall; if ſo, ſhould the ſcheme be deemed worthy of Notice or Trial, Hawſe-Holes may with eaſe be enlarged, the Cable will pay out with the ſame Eaſe as if there were no Chains round it, and if it ſhould come in rather heavier than uſual, a Boy, or ſpare Man, may be placed in the Head of the Veſſel, to caſt off the Chains as they come up, and hand them in above; there probably may be a few Minutes more Difficulty attending this Plan than the common weighing of an Anchor, but we are to obſerve that a Grain or two of Trouble ought by no Means to be placed in Competition with the Load of Preſervation which may attend the Veſſel and Crew by making uſe of it.

In high Latitudes, where Ice may cut or damage the Cables, while riding at Anchor, it would be beſt to have 3 other Chains of the ſame Nature with the former, but only five or ſix Fathom in length, which by being wormed round the Part of the Cable that is at the Edge of the Water, would prevent the Ice from wounding it or chafing it quite aſunder, which has frequently happened during the Winter Seaſon on our own Coaſts.

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